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DEVICE SPECIFICATION FOR

Control-PWB unit

MODEL No.

LP0DZC0002

These parts are complied with the RoHS directive.

*If you have any problems to this specification, please let us know before placing an order.

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RECORDS OF REVISION

Model No.: LP0DZC0002

SPEC No.	DATE	REVISED No.	PAGE	SUMMARY	MARKS
LD-2025203	21-Feb-25	-	-	-	

1. Application

This specification applies to the following Control-PWB unit (C-PWB) that can only be used exclusively for the following TFT-EPD Open-Cell. Each electrical characteristic is defined in combination with the following TFT-EPD Open-Cell.

Model No.	SDTC Product No.	SDTC Part Code	Mating Open-Cell Model No.	Mating Open-Cell SDTC Product No.	Remarks
LP0DZC0002	A1LP0DZC0002	RUNTK7033TPZZ	LP285A6NW01	A1LP285A6NW01	

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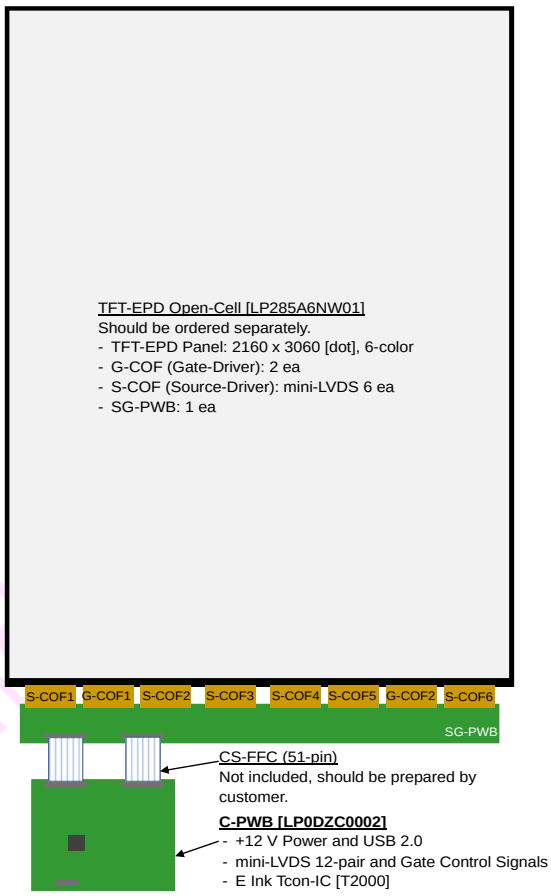
In case of using the device for applications such as control and safety equipment for transportation, aircraft, trains, automobiles, etc., rescue and security equipment and various safety related equipment which require higher reliability and safety, take into consideration that appropriate measures 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.

SC and SDTC assumes no responsibility for any damage resulting from the use of the device that does not comply with the instructions and the precautions specified in this specification.

Contact and consult with a SDTC sales representative for any questions about this product.



2. Overview

This C-PWB has the following features.

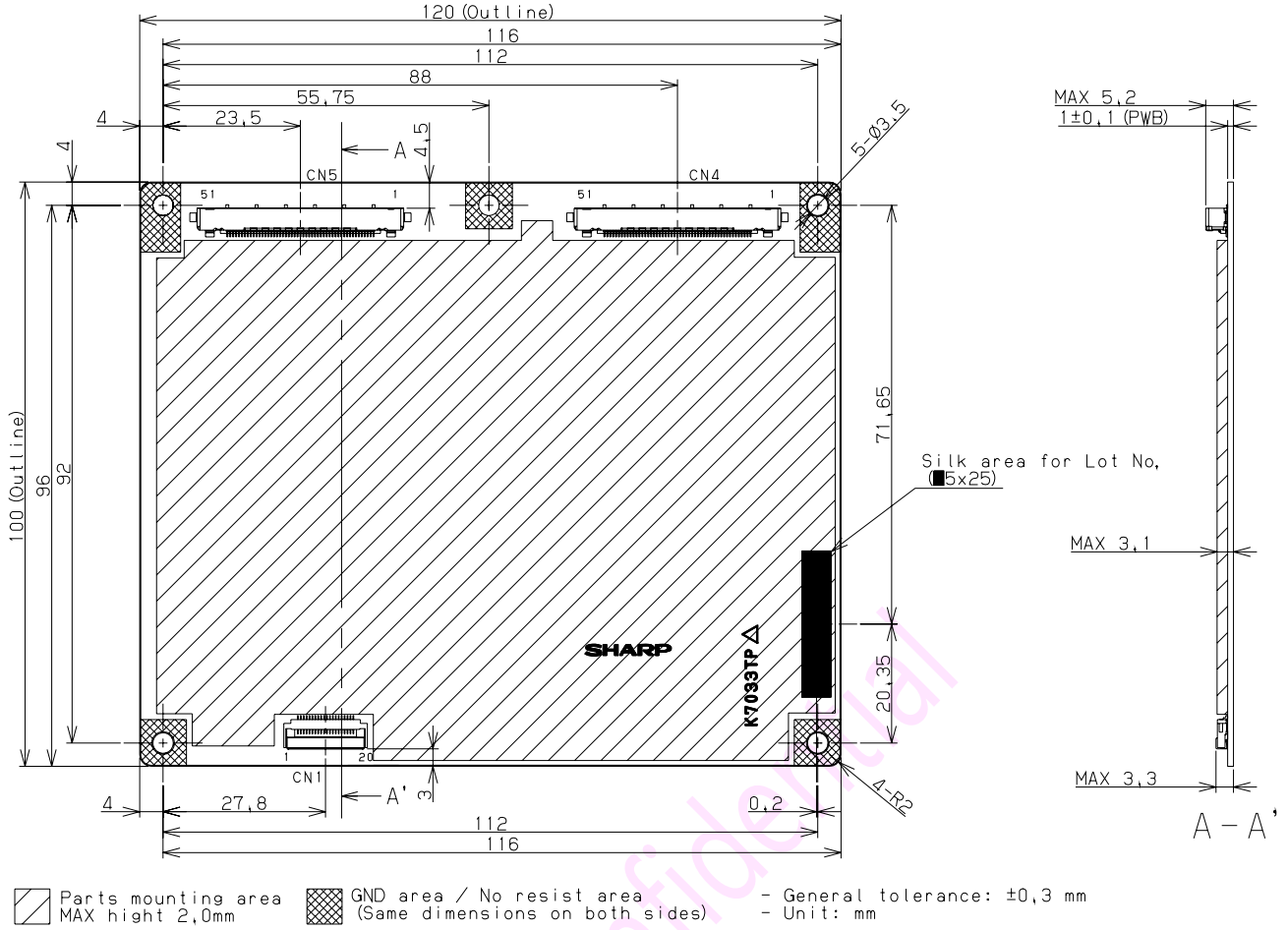
- Only for the TFT-EPD Open-Cell by SDTC, **LP285A6NW01**.
- 6 colors (White/Red/Green/Blue/Yellow/Black) displayable on the TFT-EPD Open-Cell with +12 V Power Supply and USB 2.0 input.

3. Mechanical Specifications

3.1. Main Specifications

Items	Specifications	Units
Outline	120 x 100	mm
Thickness	Total: 5.2 (Max., 51-pin CNT) PWB: 1.0±0.1	mm
Weight	0.05	kg
PWB Material	FR-4.1	-
PWB Layer Structure	4-layer	-
Surface treatment	ENIG	-
PWB UL Type	ML1	-
PWB UL Frame-proof Grade	94V-0	-
PWB UL No.	E253117	-

3.2. Outline Dimensions



4. Driving Specifications

4.1. Interface Specifications

CN1: +12 V Power Supply and USB 2.0 Signals

- Using connector: TF31-20S-0.5SH(800) [HIROSE] or compatible
- Mating connector: 0.5 mm pitch FFC or FPC

Pin No.	Pin Names	Functions	Remarks
1	12V IN	+12 V Power Supply	
2	12V IN	+12 V Power Supply	
3	12V IN	+12 V Power Supply	
4	12V IN	+12 V Power Supply	
5	12V IN	+12 V Power Supply	
6	GND	Ground	1)
7	GND	Ground	1)
8	GND	Ground	1)
9	GND	Ground	1)
10	GND	Ground	1)
11	NC	No Connection	
12	DATA-	USB 2.0 Data-	
13	DATA+	USD 2.0 Data+	
14	NC	No Connection	
15	GND	Ground	1)
16	NC	No Connection	
17	GND	Ground	1)
18	I2C_CLK	No Connection (Manufacturer Only)	
19	I2C_DATA	No Connection (Manufacturer Only)	
20	GND	Ground	1)

1) GND must be common with the customer's system ground.

4.2. Output Specifications

CN4: To CN1 of LP285A6NW01

- Using connector: 187059-51221 [P-TWO] or compatible
- Mating connector: 187104-51001-3 [P-TWO] or compatible

Pin No.	Pin Names	Functions	Remarks
1	MODE	Gate driver output control	2)
2	XON	No Connection	
3	STBYB	mini-LVDS enable	1)
4	NC	No Connection	
5	NC	No Connection	
6	NC	No Connection	
7	NC	No Connection	
8	VGL	Gate Driver Negative Power	
9	VGL	Gate Driver Negative Power	
10	NC	No Connection	
11	VN3	Source Driver Negative Power	
12	VN3	Source Driver Negative Power	
13	VN3	Source Driver Negative Power	
14	NC	No Connection	
15	VN2	Source Driver Negative Power	
16	VN2	Source Driver Negative Power	
17	VN2	Source Driver Negative Power	
18	NC	No Connection	
19	VN1	Source Driver Negative Power	
20	VN1	Source Driver Negative Power	
21	VN1	Source Driver Negative Power	
22	NC	No Connection	
23	GND	Ground	
24	GND	Ground	
25	NC	No Connection	
26	VDD	Logic Power	
27	VDD	Logic Power	
28	NC	No Connection	
29	VP1	Source Driver Positive Power	
30	VP1	Source Driver Positive Power	
31	VP1	Source Driver Positive Power	
32	NC	No Connection	
33	VP2	Source Driver Positive Power	
34	VP2	Source Driver Positive Power	
35	VP2	Source Driver Positive Power	
36	NC	No Connection	
37	VP3	Source Driver Positive Power	
38	VP3	Source Driver Positive Power	
39	VP3	Source Driver Positive Power	
40	NC	No Connection	
41	VGH	Gate Driver Positive Power	
42	VGH	Gate Driver Positive Power	
43	NC	No Connection	
44	NC	No Connection	
45	NC	No Connection	
46	VCOM	Common Voltage	6)
47	VCOM	Common Voltage	6)
48	NC	No Connection	
49	VCOM	Common Voltage	6)
50	VCOM	Common Voltage	6)
51	VCOM	Common Voltage	6)

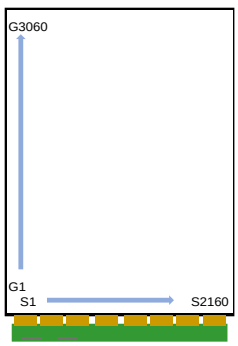
CN5: To CN2 of LP285A6 NW01

- Using connector: 187059-51221 [P-TWO] or compatible
- Mating connector: 187104-51001-3 [P-TWO] or compatible

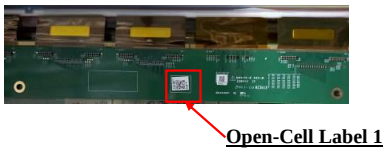
Pin No.	Pin Names	Functions	Remarks
1	GND	Ground	
2	LV0P	mini-LVDS data signal	6)
3	LV0N	mini-LVDS data signal	6)
4	GND	Ground	
5	LV1P	mini-LVDS data signal	6)
6	LV1N	mini-LVDS data signal	6)
7	GND	Ground	
8	LV2P	mini-LVDS data signal	6)
9	LV2N	mini-LVDS data signal	6)
10	GND	Ground	
11	LV3P	mini-LVDS data signal	6)
12	LV3N	mini-LVDS data signal	6)
13	GND	Ground	
14	LV4P	mini-LVDS data signal	6)
15	LV4N	mini-LVDS data signal	6)
16	GND	Ground	
17	LV5P	mini-LVDS data signal	6)
18	LV5N	mini-LVDS data signal	6)
19	GND	Ground	
20	CLKP	mini-LVDS data clock	6)
21	CLKN	mini-LVDS data clock	6)
22	GND	Ground	
23	LV6P	mini-LVDS data signal	6)
24	LV6N	mini-LVDS data signal	6)
25	GND	Ground	
26	LV7P	mini-LVDS data signal	6)
27	LV7N	mini-LVDS data signal	6)
28	GND	Ground	
29	LV8P	mini-LVDS data signal	6)
30	LV8N	mini-LVDS data signal	6)
31	GND	Ground	
32	LV9P	mini-LVDS data signal	6)
33	LV9N	mini-LVDS data signal	6)
34	GND	Ground	
35	LV10P	mini-LVDS data signal	6)
36	LV10N	mini-LVDS data signal	6)
37	GND	Ground	
38	LV11P	mini-LVDS data signal	6)
39	LV11N	mini-LVDS data signal	6)
40	GND	Ground	
41	CKV	Gate clock	
42	GND	Ground	
43	SPH1	Source driver start pulse	5)
44	SPH2	Source driver start pulse	5)
45	SPV1	Gate driver start pulse	5)
46	SPV2	Gate driver start pulse	5)
47	SHR	Source driver scan direction control	5)
48	UD	Gate driver scan direction control	5)
49	OEH	Source driver output enable	4)
50	LEH	Source driver latch enable	
51	DSEL	Source driver data input select	3)

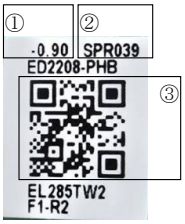
1) STBYB = L: mini-LVDS standby.
2) MODE = H: Normal Single Pulse / MODE = L: No Output Pulse
3) DSEL = H: 12-pair mini-LVDS (with TTL_SEL = L)
4) OEH = H: Source outputs are enabled / OEH = L: Source outputs forced to GND when output polarity change. (Default)
5) Set the scan direction as follows.

Scan Direction	UD	SPV1	SPV2	SHR	SPH1	SPH2	Remarks
S1 to S2160 G1 to G3060	H	Input	Output	L	Input	Output	



6) The Common Voltage (VCOM) and Wave Form (WF) for optimal image control for each individual TFT-EPD Open-Cell to be combined must be written into the ROM of this C-PWB by the customer. Each information is shown on the Open-Cell Label 1 as follows.





① Vcom Value: e.g., -0.9 V
② FPL Lot No.: e.g., SPR039
③ QR Code: e.g., HC3R2**SPR039**GZ9V00005AT-**0.9**
① ②

Parameters	Contents	References
VCOM	Write the value listed on the Open-Cell Label 1. e.g., -0.9 V	① of Open-Cell Label 1
WF	Select and write a file in which the FPL Lot No. on the Open-Cell Label 1 matches the digits that indicates it in the file name of the WF file (.wbf) provided separately. e.g., E6 _ **SPR039** _ L10228_EL285TW2F1-R2_ED2208PHB_TC .wbf 1 **2** 1 3 1: Manufacturer Management Digit **2: FPL Lot No.** 3: File extension	② of Open-Cell Label 1

4.3. Absolute Maximum Ratings

(GND = 0 V)

Items	Symbols	Conditions	Ratings	Units	Remarks
Power Supply Voltage	V_{IN}	Ta = 25ºC	-0.3 to +14.5	V	
USB 2.0 Data Voltage	$V_{DATA-/+}$	Ta = 25ºC	-0.3 to +3.3	V	
Storage Temperature [1)]	Tstg	-	-25 to +60	ºC	
Operation Temperature [1)]	Topa	-	0 to +50	ºC	

- Humidity: 95% RH Max. (Ta ≦ 40ºC)
- Maximum wet-bulb temperature at 39ºC or less. (Ta > 40ºC), No condensation.

1) After installation, the Open-Cell specifications must be followed.

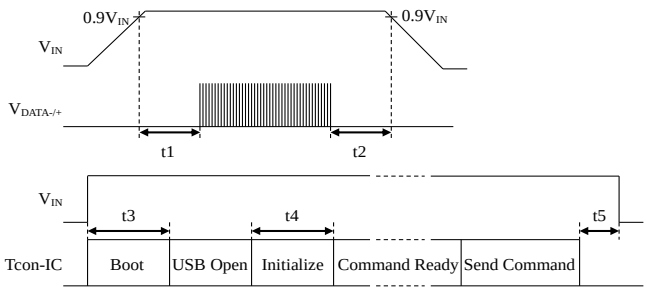
4.4. Electrical Characteristics of Input Signals (w/ TFT-EPD Open-Cell)

(GND = 0 V)

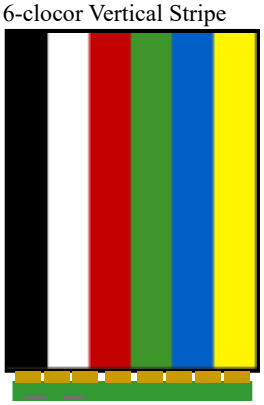
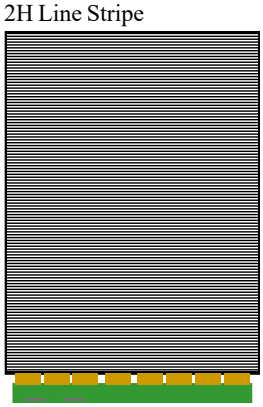
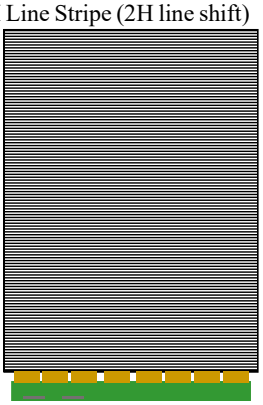
Items		Symbols	Min.	Typ.	Max.	Units	Remarks
Power Supply [1)]		V_{IN}	11.5	12.0	12.5	V	[1)]
Current Consumption [2), 3)]		I_{IN}	-	160	(500)	mA	V_{IN} = +12.0 V
Inrush Current [4)]		I_{RUSH}	-	19.6	-	A	V_{IN} = +12.0 V (t = 200 µs)
USB Data [1)]	Idle	$V_{DATA+/-}$	-10	-	10	mV	[1)]
	High		360	-	440	mV	
	Low		-10	-	10	mV	

1) ON/OFF Sequences

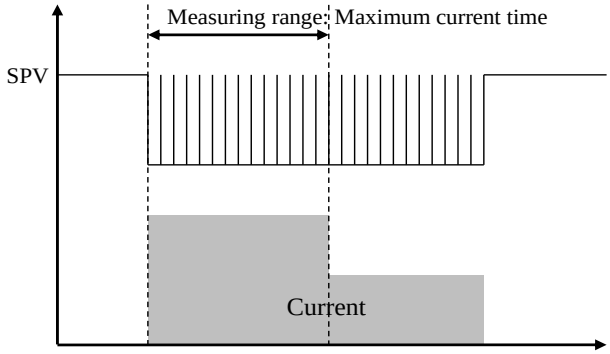
Items	Min.	Typ.	Max.	Units	Remarks
t1	100	-	-	ms	
t2	100	-	-	ms	
t3	-	2	-	s	
t4	-	2	-	s	
t5	500	-	-	ms	



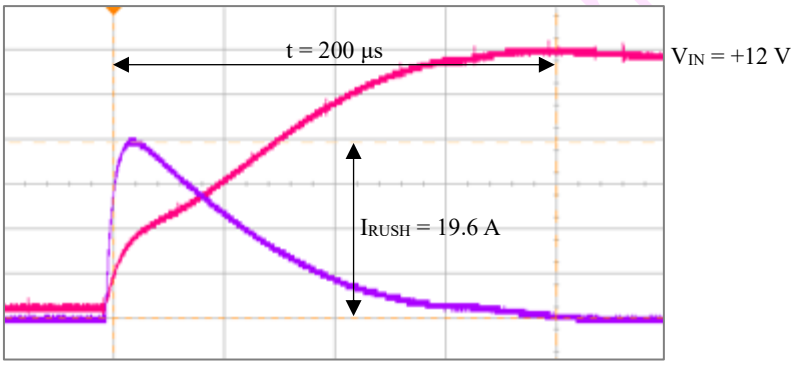
2) The typical average current for power consumption is defined in the following screen patten transitions at 50 Hz waveform.

Typ.		**Max.**	
6-color Horizontal Stripe	6-clocor Vertical Stripe	2H Line Stripe	2H Line Stripe (2H line shift)
			

3) The measurement range of current consumption defined by the following diagrams.



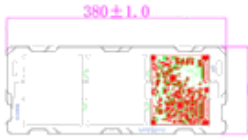
4) V_{IN} +12 V inrush current waveform



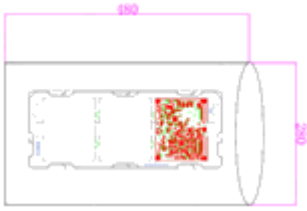
5. Delivery Specifications

5.1. Packing Form

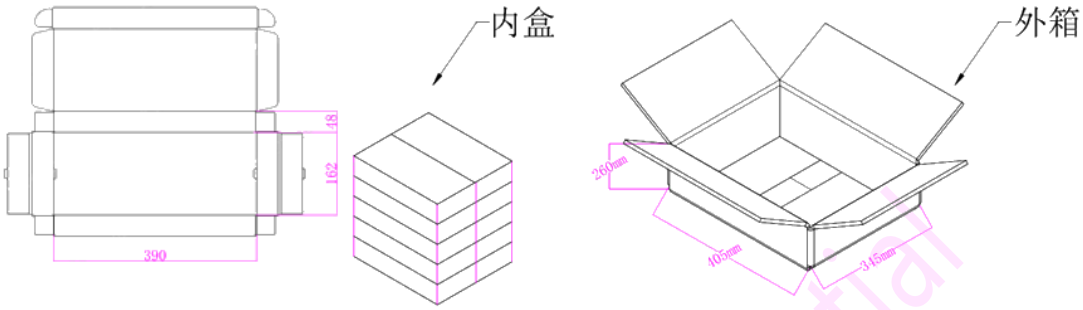
	1-box	(1-inside-box)
Size	405 x 345 x 260 [mm]	(390 x 162 x 48 [mm])
Q'ty	90 pcs (= 2-inside-box x 5-layer)	(9 pcs (= 3-pc x 3-tray + 1-empty-tray))
Weight	7.55 kg	0.7 kg



3 pcs/tray



3-tray + 1-empty-tray in Antistatic Bag / 1-inside-box

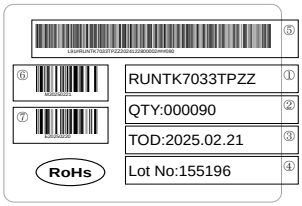


5.2. Identifications

PWB	Packing
The following information are laser marked on the Silk Area.	The following label is attached on each box.

Manufacture Label

e.g.,



① QR Code [25-digit]

e.g., TS RUNTK7033TPZZ 5 2 R 00001 08
1 2 3 4 5 6 1

1: Manufacturer Management Digit
2: SDTC Part Code
3: Production Year (202**5**)
4: Production Month (1 to 9, A=10, B=11, C=12)
5: Production Date (1 to 9, A=10 to X=31)
6: Serial Number (00001 to 99999)

② Characters

e.g., 52R0000108 – Z
1 2

1: Same as 16th digit to 23rd digit of QR Code
2: Suffix of SDTC Part Code (RUNTK7033TPZ**Z**)

① SDTC Part Code: RUNTK7033TPZZ
② Packing Quantity: pcs/box
③ Packing Date: YYYY.MM.DD
④ Packing Lot No.1: 000000 to 999999
⑤ Packing Lot No.2:

e.g., L91 # RUNTK7033TPZZ 20250221 00002 ### 090
1 2 3 4 5

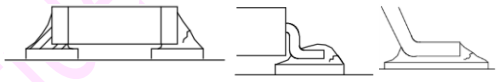
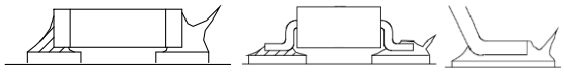
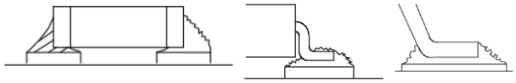
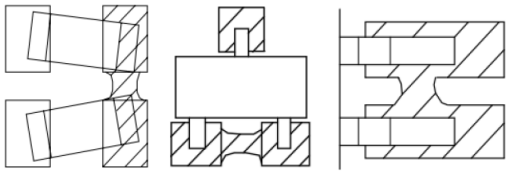
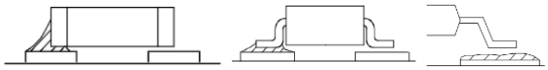
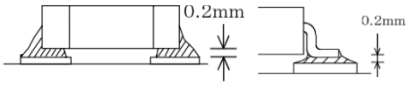
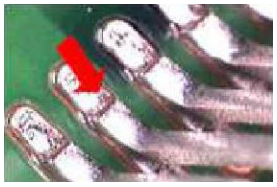
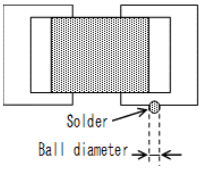
1: Manufacturer Management Digit
2: SDTC Part Code (Same as ①)
3: Packing Date (Same as ③)
4: (To be confirmed)
5: Packing Quantity (Same as ②)

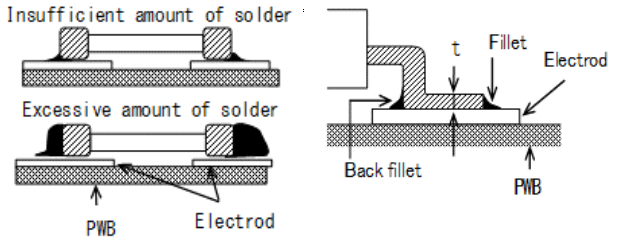
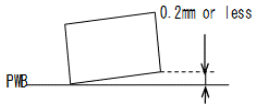
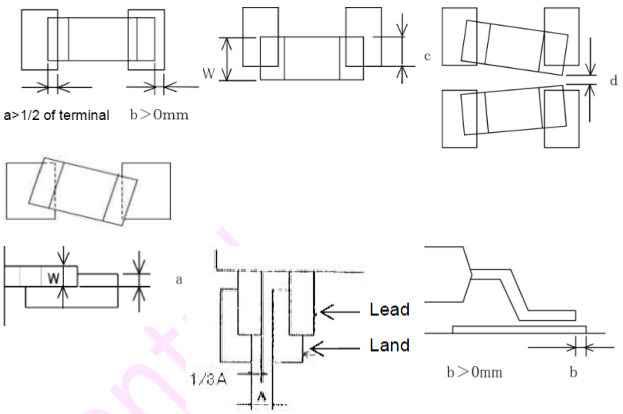
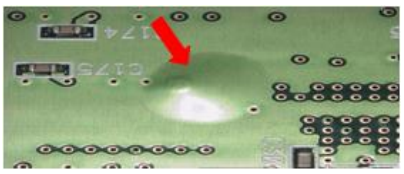
6. Reliability

No.	Test Items	Conditions
1	High temperature storage test [2)]	Ta = 60ºC, 35% RH, 240 hours
2	Low temperature storage test [2)]	Ta = -25ºC, 240 hours
3	High temperature and high humidity storage test [2)]	Ta = 60ºC, 80% RH, 240 hours (No condensation)
4	High temperature and high humidity operation test [1), 2)]	Ta = 40ºC, 90% RH, 240 hours (No condensation)
5	High temperature operation test [1), 2)]	Ta = 50ºC, 30% RH, 240 hours
6	Low temperature operation test [1), 2)]	Ta = 0ºC, 240 hours
7	Temperature cycle storage test [2)]	Ta = -25ºC (30 min) ←→ 60ºC (30 min), 50 cycle
8	ESD test [2)]	Input: ±250 V, 0-ohm, 200 pF (Machine Model, Non-operation)
9	Packing vibration test [2)]	Frequency: 5 to 50 Hz, Round-trip time (3 min/time) Acceleration: Constancy 1G, X/Y axis: 15 min, Z axis: 60 min
10	Packing drop test [2)]	Hight: 75 cm from the concrete or iron board 1 corner, 3 edges, and 6 faces

1) The operation test is performed with the TFT-EPD Open-Cell [LP285A6NW01] being rewritten every 150 sec.
2) The following items shall be satisfied.
- There shall be no defects in the quality standard in the next section.
- Meet the driving conditions specified in the specifications of TFT-EPD Open-Cell [LP285A6NW01].
- No defects in the display of TFT-EPD Open-Cell [LP285A6NW01].

7. Quality Standard

No.	Check Items	
1	No solder cracks.	
2	No solder holes.	
3	No spike soldering.	
4	No cold soldering. Solder surface should show glossing.	
5	No solder bridges.	
6	No solder loss.	
7	Soldering thickness Terminal, lead, or electrode of any part should not be lifted away from the board more than 0.2mm.	
8	Incomplete soldering. No exposed terminal surface due to insufficient solder flow.	
9	Solder Ball diameter ≦ 0.3 mm 0.05 to 0.3 mm: 8 pcs or less 0.05 mm or less: No Count	

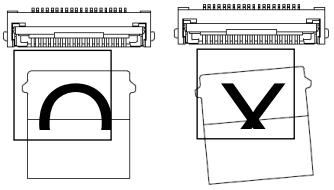
10	Fillet of solder - Electrode components 0.3 mm < amount of solder < t+0.5 mm (Excluding those with no reliability impact.) - Lead components Back fillet height ≧ t Fillet formation as “amount of solder > 1/2t” (t: Thickness of the lead electrode)	
11	Part floating: 0.2 mm or less Parts in areas with height restrictions are defined separately. (DC-DC: 0.1 mm or less)	
12	Misalignment components - Electrode components Horizontal: a > 1/2 of terminal, b > 0 mm Vertical: c ≧ 2/3W, d > 0.3 mm θ Shift: Contact Area ≧ 2/3 x Electrode Area - Lead components Horizontal: a > 2/3W, 1/3A Vertical: b > 0 mm	
13	d4 ≧ 0.3 mm: NG d4: CNT pin edge to pad outside	
14	No short circuit between connector terminals and power line.	
15	No expansion of PWB surface. No delamination between layers.	
16	No foreign materials, such as flux, solder resist, silk, solder, etc., shall adhere in the plating area and the inside diameter of the hole.	
17	No Cu exposure in the plating area.	
18	No pattern defects, dents, or pinholes of 0.2 mm dia. or larger in the plating area.	
19	Scratch in the plating area. - Line width ≦ 200 μm - Distance ≧ 1 mm Scratch on the gold plating layer only (without Ni exposure). - Ignore (width, distance)	
20	No chips, cracks, or burrs on the edge of PWB.	
21	Various markings, silk, laser marking, etc., on the surface of the PWB must be identifiable with certainty.	
22	Conducting as per the circuit diagram.	

8. Precautions

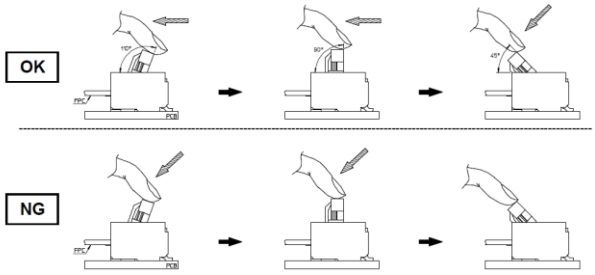
1) Handle the C-PWB with the extreme care using the grounded anti-static wrist band to protect electronic circuits with CMOS-ICs from electrostatic breakdown.
   - Reference: Process control standard of sharp

No.	Items	Management standard value and performance standards
1	Anti-static mat (floor)	1 to 50 [Mohm]
2	Anti-static mat (shelf, desk)	1 to 100 [Mohm]
3	Ionizer	Attenuate from ±1000 V to ±100 V within 2 sec
4	Anti-static wrist band	0.8 to 10 [Mohm]
5	Anti-static wrist band entry and ground resistance	Less than 1000 ohm
6	Temperature	22 to 26 [°C]
7	Humidity	60 to 70 [%]

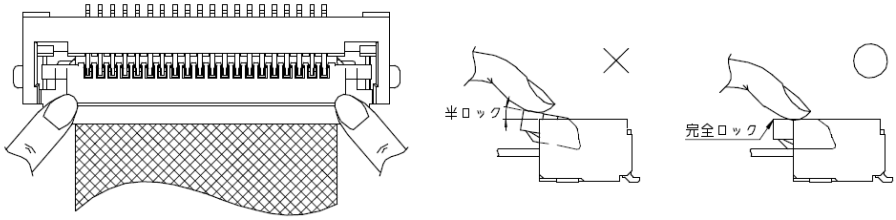
2) Do not touch with chemical-treated clothes or greasy fingers, etc., as some components may degrade the surface.
3) Dust on the surface of each component should be blown away with an N2 blower such as an ionizing air gun with anti-static measures.
4) Handle the Open-Cell with great care so that it is not dropped or bumped on a hard surface to prevent the glass, the main constituent material, from breaking or cracking.
5) Take care to keep the PWB from any stress or pressure when handling or installing the Open-Cell.
6) Do not store the PWB in the environment of oxidization or deoxidization gas for a long time and not use such materials as reagent, solvent, adhesive, resin, etc., which generate these gasses when assembling them into cabinets to prevent corrosion and discoloration.
7) Applying too much force and stress to the PWB may cause a malfunction electrically and mechanically.
8) Handle with care based on the general connector's specification when inserting and removing it.
   - Do with the actuator opened completely and insert it in the interior of the insertion entrance surely horizontally when you insert FPC. (Put the FFC or FPC tab in the ditch of the housing surely with the FPC tab.) Might it become short defective, and it causes the corner to transform the caught terminal into the terminal by the pitch gap when inserting it right and left and diagonally.



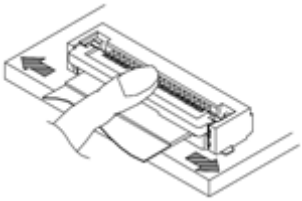
   - Add force in the direction where the actuator is held and do by rotating it pushing in parallel to the C-PWB direction when becoming 90° or less as shown in the figure below until the angle of the actuator becomes 90° or less when you shut the actuator. Do not add the force to rotary axis of actuator in the direction that the actuator is off.



   - When you lock, it should be push on both sides of the actuator. And it is necessary to confirm that the actuator is surely shut.



   - After the actuator is closed, press down the surface of actuator with soft pressure in order to lock as shown in the following figure.



9) Turn off the power supply when inserting or disconnecting the cable.
10) Consider the design of power protection circuit in case of failure of this PWB according to the customer's operating conditions.
11) EMC should be fully verified with the customer's final product.
12) The chemical compound, which causes the destruction of ozone layer, is not being used.

13) This PWB is corresponded to RoHS.
14) The ozone-depleting substances is not used.
15) Follow the regulations when the PWB is scrapped.
16) When parts specifications or materials and production process will be changed, SDTC will submit to written proposal to the customer and change these after customer's acceptance.
17) Refer to the latest Design Notice of the Open-Cell for other precautions as well.
18) The OPEN-CELL SPECIFICATIONS should be thoroughly reviewed.
19) When any question or issue occurs, it shall be solved by mutual discussion.

9. Storage Conditions

Items	Before opening the inside box	(Reference: After opening the inside box)
Temperature	0ºC to 40ºC	(18ºC to 28ºC)
Humidity	35% RH to 75% RH	(40% RH to 60% RH)
Atmosphere	Harmful gas, such as acid and alkali which bites electronic components and/or wires must not be detected.	
Anticondensation	Be sure to put boxes on the airy pallet or base, do not put it on floor, and store them with removing from wall. Take care of ventilation in storehouse and around cartons, and control changing temperature is within limits of natural environment.	
Vibration	Refrain from keeping the product in the place which always has vibration.	
Storage life	Within 6 months	(Within 7 days)