



DUOBOND DISPLAY TECHNOLOGY CO.,LTD
PRODUCT SPECIFICATION

MODEL NAME: DBT133TIU40E3

Date: 2020/04/15

Version: 1.1

- Preliminary Specification
- Final Specification

FOR CUSTOMER	
CUSTOMER APPROVED	

PREPARED BY	CHECKED BY	APPROVED BY	DATE

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1 General Specifications

	Feature	Spec
Display Spec.	Size	13.3inch
	Resolution	3840×RGB×2160 (UHD,332PPI)
	Technology Type	a-Si TFT
	Pixel Configuration	RGB stripe
	Pixel pitch(um)	76.5×76.5
	Display Mode	Transmissive ,Normally Black
	Surface Treatment	HC
	Viewing Direction	ALL
	Gray Scale Inversion Direction	NA
Mechanical Characteristics	LCM (W x H x D) (mm) --FOG TFT size	302.36×176.94×1.228
	Active Area(mm)	293.76×165.24
	With /Without TSP	Without TSP
	Matching Connection Type	I-PEX 20455-040E-76
	LED Numbers	NA
	Weight (g)	TBD
Electrical Characteristics	Interface	eDP1.4
	Color Depth	16.7M
	Driver IC	TC2058BG4BLK-A0 *8 at 6 o'clock

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: Requirements on Environmental Protection: Q/S0002+HF

Note 3: LCM weight tolerance: ± 5%

2 Input/Output Terminals

Connector type: IPEX 20455-040E-76

Pin No.	Symbol	I/O	Function	Remark
1	DE_EN	--	No connection	
2	GND	P	Ground	
3	LAN3_N	I	Main link lane3 negative input	
4	LAN3_P	I	Main link lane3 positive input	
5	GND	P	Ground	
6	LANE2_N	I	Main link lane2 negative input	
7	LANE2_P	I	Main link lane2 positive input	
8	GND	P	Ground	
9	LANE1_N	I	Main link lane1 negative input	
10	LANE1_P	I	Main link lane1 positive input	
11	GND	P	Ground	
12	LANE0_N	I	Main link lane0 negative input	
13	LANE0_P	I	Main link lane0 positive input	
14	GND	P	Ground	
15	AUXCHP	I/O	AUX channel positive input/output	
16	AUXCHN	I/O	AUX channel negative input/output	
17	GND	P	Ground	
18	LCD_VCC	P	LCD logic and driver power	
19	LCD_VCC	P	LCD logic and driver power	
20	LCD_VCC	P	LCD logic and driver power	
21	LCD_VCC	P	LCD logic and driver power	
22	BIST_EN	I	BIST mode enable	
23	LCD_GND	P	Ground	
24	LCD_GND	P	Ground	
25	LCD_GND	P	Ground	
26	LCD_GND	P	Ground	
27	HPD	I/O	HPD signal pin	
28	NC	--	No connection	
29	NC	--	No connection	
30	NC	--	No connection	
31	NC	--	No connection	
32	NC	--	No connection	
33	NC	--	No connection	
34	NC	--	No connection (SCL) ,Leave this pin open	
35	NC	--	No connection (SDA) ,Leave this pin open	
36	NC	--	No connection	
37	NC	--	No connection	
38	NC	--	No connection	
39	NC	--	No connection	
40	NC	--	No connection	

Note1: I----Input, O----Output, P----Power/Ground

3 Absolute Maximum Ratings

GND=0V, Ta = 25°C

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	0.3	3.6	V	
Operating Temperature	Top	0	60	°C	
Storage Temperature	Tst	-20	80	°C	
Relative Humidity Note2	RH	--	≤95	%	Ta≤40°C
		--	≤85	%	40°C < Ta ≤ 50°C
		--	≤55	%	50°C < Ta ≤ 60°C
		--	≤36	%	60°C < Ta ≤ 70°C
		--	≤24	%	70°C < Ta ≤ 80°C
Absolute Humidity	AH	--	≤70	g/m ³	Ta > 70°C

Table 3 Absolute Maximum Ratings

Note: Ta means the ambient temperature.

It is necessary to limit the relative humidity to the specified temperature range.

Condensation on the module is not allowed.

4 Electrical Characteristics

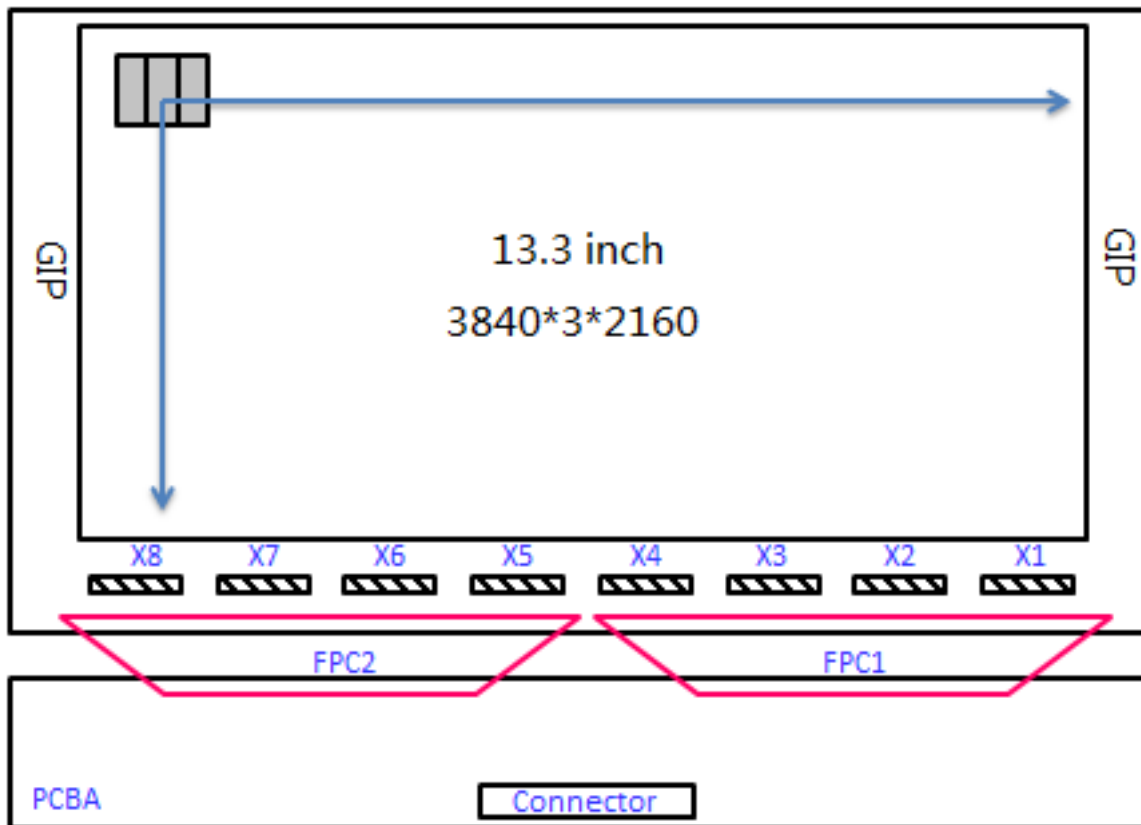
4.1 Driving TFT LCD Panel

GND=0V, Ta=25°C

Item	Symbol	Min	Typ	Max	Unit	Remark
Digital Supply Voltage	VDD	3.2	3.3	3.4	V	
LCD Power Consumption	P	--	TBD	--	W	

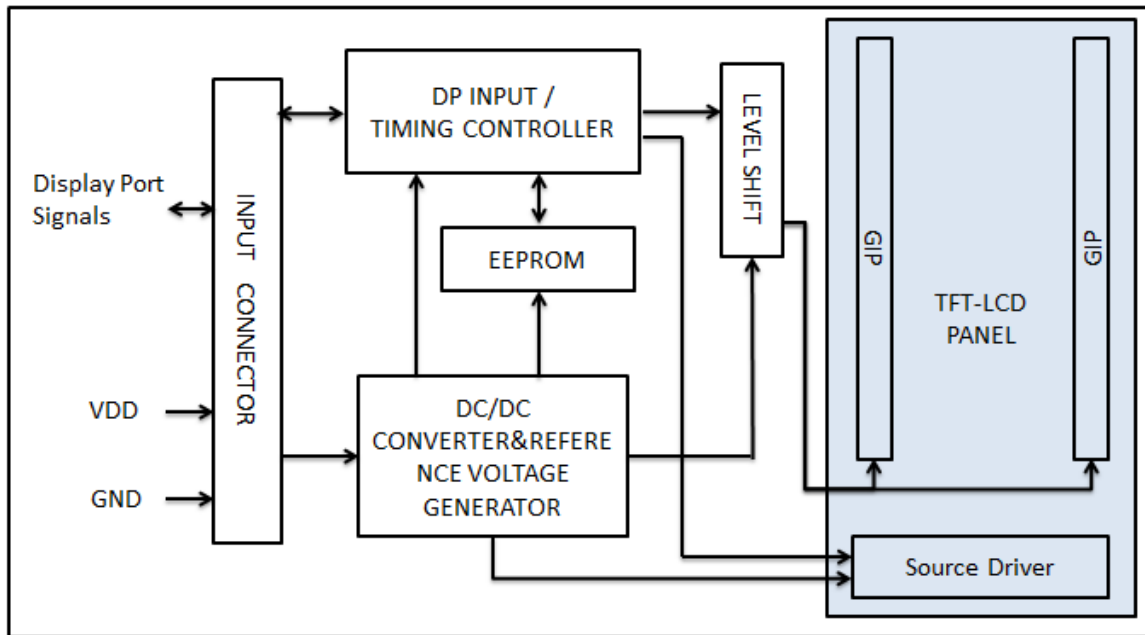
Table 4.1 LCD module electrical characteristics(voltage)

4.2 BLOCK DIAGRAM



5 Timing Chart

5.1 Display Edp1.4 Reference Circuit



5.2 eDP1.4 Data Format

5.2.1 Displayport™ AUX channel characteristics

Symbol and Parameter	Test Conditions	Min	Typ ¹	Max	Unit
UI:	Unit interval for AUX channel	0.4	0.5	0.8	μs
V _{AUX-DIFF-P-P} :	AUX differential peak-to-peak voltage at TP1 when driving the bus	500		800	mV
V _{AUX-DC-CM-RX} :	AUX common mode voltage when receiving		GND		V
V _{AUX-DC-CM-TX} :	AUX common mode voltage when transmitting		0.15		V
I _{AUX-SHORT} :	AUX channel short circuit current			20	mA
R _{AUX-DIFF} :	Differential termination resistance	80	100	120	Ω
R _{AUX-SE} :	Single-ended termination resistance	40	50	60	Ω
C _{AUX} :	AUX AC coupling capacitor	75		200	nF

5.2.2 DISPLAYPORT™ MAIN LINK RECEIVER CHARACTERISTICS

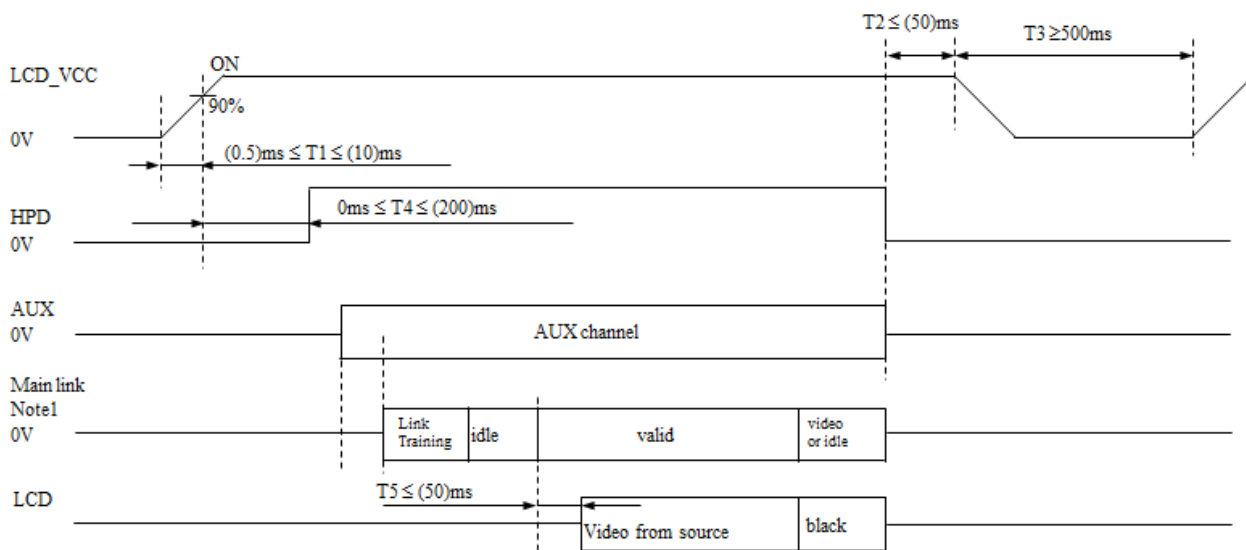
Symbol and Parameter	Test Conditions	Min	Typ ²	Max	Unit
Spread spectrum clock, down-spreading by SOURCE			0.5		%
VRX-DIFF _{p-p} : Differential peak-to-peak input voltage at package pins		100		1320	mV
Maximum adaptive/programmable equalization level at 2.7GHz			10		dB
VRX_DC_CM: Rx input DC common mode voltage			GND		V
RRX-DIFF: Differential termination resistance		80	100	120	Ω
RRX-SE: Single-ended termination resistance		40		60	Ω
IRX_SHORT: Rx short circuit current limit				20	mA
LRX_SKEW_INTRA_PAIR: Intra-pair skew at Rx package pins (HBR2) RX intra-pair skew tolerance at HBR2				60	ps
LRX_SKEW_INTRA_PAIR: Intra-pair skew at Rx package pins (HBR) RX intra-pair skew tolerance at HBR				150	ps
LRX_SKEW_INTRA_PAIR: Intra-pair skew at Rx package pins (RBR) RX intra-pair skew tolerance at RBR				300	ps
Receiver Jitter Tolerance for High Bit Rate 2 (HBR2)					
Total jitter tolerance at 2MHz		1026			mUI
Total jitter tolerance at 10MHz		636			mUI
Total jitter tolerance at 20MHz		624			mUI
Total jitter tolerance at 100MHz		620			mUI
Receiver Jitter Tolerance for High Bit Rate (HBR)					
Total jitter tolerance at 2MHz		1227			mUI
Total jitter tolerance at 10MHz		548			mUI
Total jitter tolerance at 20MHz		505			mUI
Total jitter tolerance at 100MHz		491			mUI
Receiver Jitter Tolerance for Reduced Bit Rate (RBR)					
Total jitter tolerance at 2MHz		1648			mUI
Total jitter tolerance at 10MHz		778			mUI
Total jitter tolerance at 20MHz		747			mUI

5.3 Timing Characteristics

Parameter		Symbol	min.	typ.	max.	Unit	Remark	
CLK	Frequency	1/tc	TBD	533.26	TBD	MHz	1.875ns(Typ.)	
DE	Horizontal	Cycle	th	-	7.5	-	μs	133.31KHz(Typ.)
			TBD	4000	TBD	CLK		
	Vertical (One Frame)	Cycle	tv	-	16.67	-	ms	60Hz(Typ.)
			TBD	2222	TBD	H		
	Display period	tvd	2160			H		
	Display period	thd	3840			CLK		

Note: Definition of parameters is as follows.
tc= 1CLK,th= 1H

5.4 POWER ON/OFF SEQUENCE



■ 6 Optical Characteristics

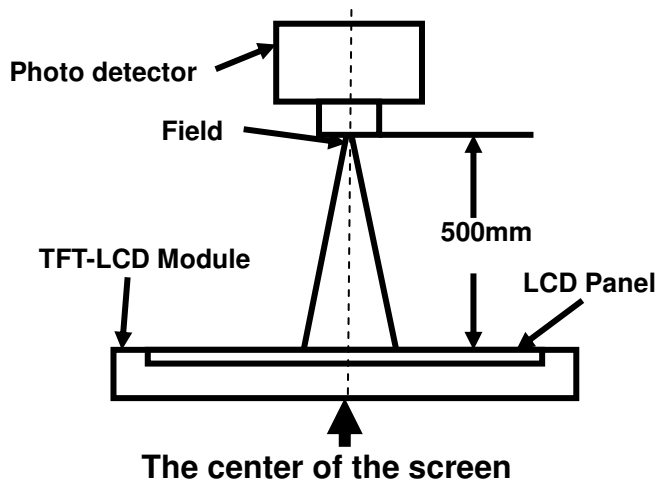
Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	θT	$CR \geq 10$		85		Degree	Note2,3
	θB			85			
	θL			85			
	θR			85			
Contrast Ratio	CR	$\theta=0^\circ$	600	800			Note 3
Response Time	T_{ON}	25°C		35		ms	Note 4
	T_{OFF}						
Chromaticity	White	x	Backlight is on		--		Note 1,5
		y			--		
	Red	x			--		Note 1,5
		y			--		
	Green	x			--		Note 1,5
		y			--		
	Blue	x			--		Note 1,5
		y			--		
Uniformity	U		80	90		%	Note 6
NTSC		MONO		--		%	Note 5
Transmission	L	405nm		6		%	Note 7

Test Conditions:

1. The ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

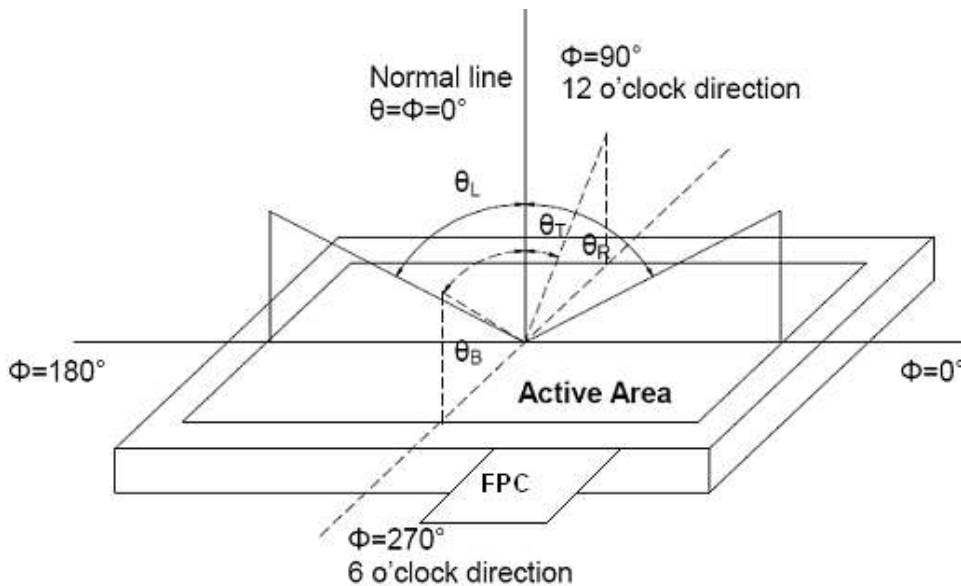
Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

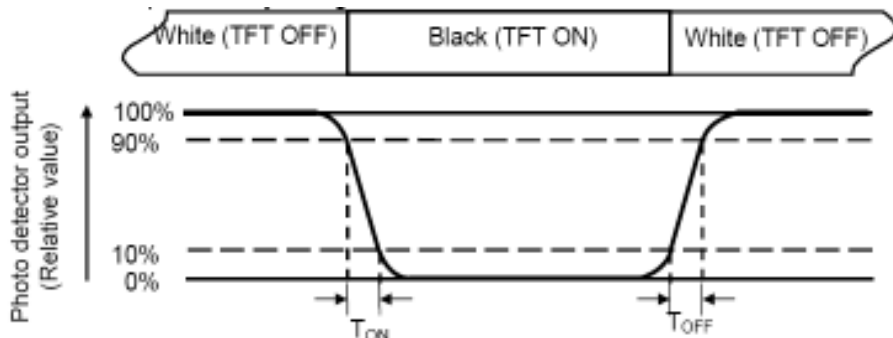
“White state “: The state is that the LCD should drive by V_{white}.

“Black state”: The state is that the LCD should drive by V_{black}.

V_{white}: To be determined V_{black}: To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

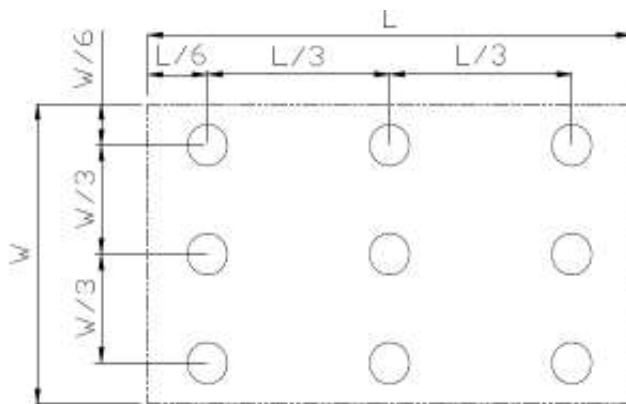
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (U)} = L_{\min} / L_{\max}$$

L-----Active area length W----- Active area width



L_{\max} : The measured Maximum luminance of all measurement position.

L_{\min} : The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta = +60°C , 240H	IEC60068-2-1:2007 GB/T 2423.2-2008
2	Low Temperature Operation	Ta =0°C ,240H	IEC60068-2-1:2007 GB/T 2423.1-2008
3	High Temperature Storage	Ta =+80°C ,240H	IEC60068-2-1:2007 GB/T 2423.2-2008
4	Low Temperature Storage	Ta =-20°C , 240H	IEC60068-2-1:2007 GB/T 2423.1-2008
5	Operation at High Temperature and Humidity	Ta =60°C ,90%RH,240H	IEC60068-2-78 :2012 GB/T 2423.3—2016
6	Thermal Shock (non-operation)	-20°C -+80°C , 30min , Change Time: 5min , total 100cycle	Start with cold temperature, End with high temperature, IEC60068-2-14:2009, GB/T 2423.22-2012
7	Package Vibration Test	Frequency (Hz) 5~20-200Hz, PSD:0.01-0.01-0.001 Total:0.781g ² /Hz , Time : X/Y/Z 30min/axis , total 90min.	GB/T 4857.23-2012
8	Package Drop Test	Carton ≤10Kg , Height:80cm; Carton > 10Kg, , Height:60cm; 1corner,3edges,6surfaces	ISO 2248:1985 GB/T 4857.5-1992
9	Imaging sticking	25°C , checkerboard 1H, release 5min,128Gray	

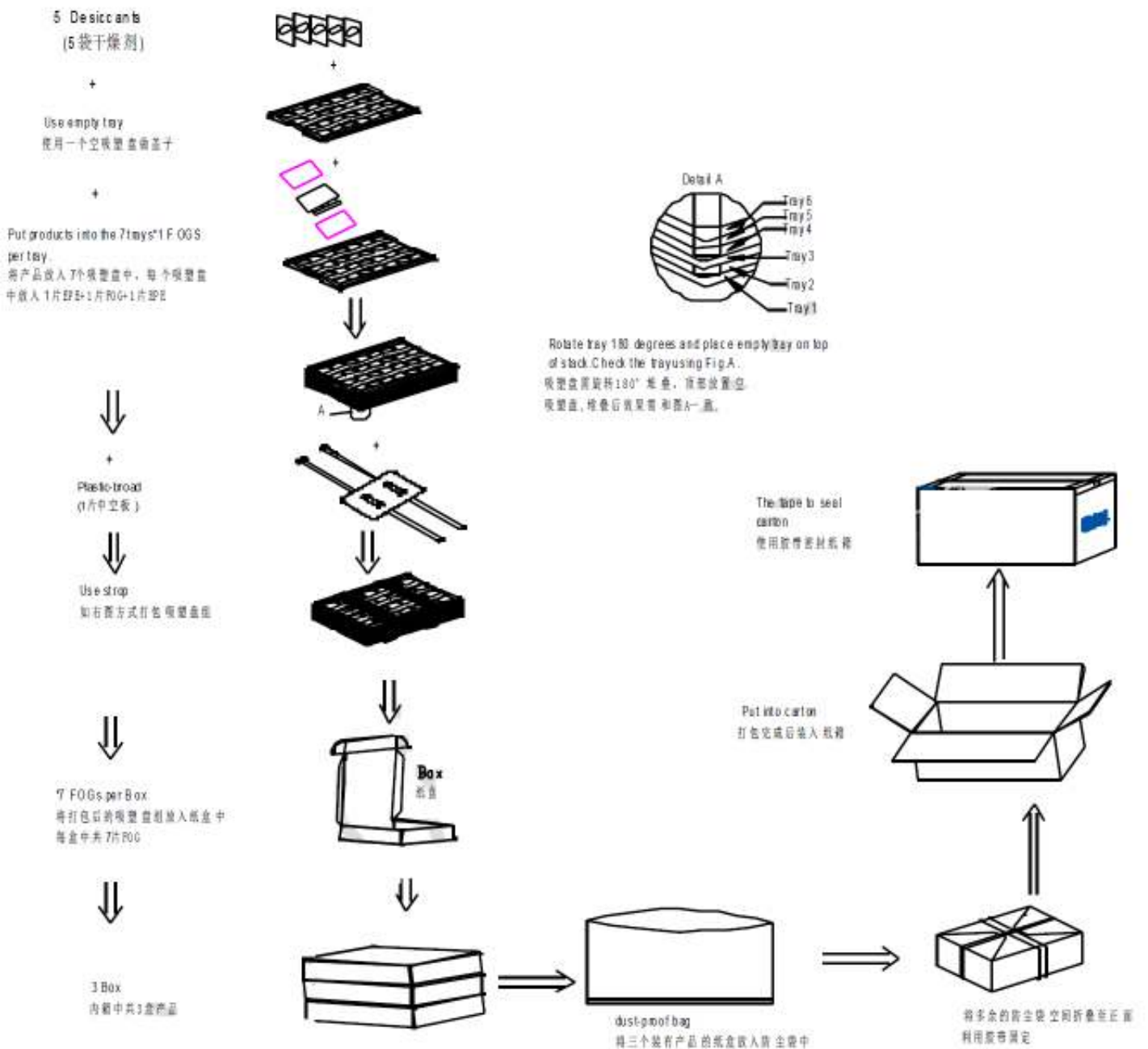
Note1: Ta is the ambient temperature of sample.

Note2: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

9 Packing Information

No	Item	Model (Materiel)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	FOG	DBT133TIU40E3	302.36×176.94×1.24mm	---	21	
2	Tray	PET (Transmit)	485x330x13.0	---	24	
3	Dust-proof Bag	PE	700x545	---	6	
4	BOX	CORRUGATED PAPER	520x345x74	0.388	3	
5	Drier	Silicon	45×35	0.002	15	
6	Carton	CORRUGATED PAPER	544x365x250	1.01	1	
7	Label	Label	? x? mm	---	1	
8	Plastic board	PE	485x330x5	0.05	3	
9	EPE	EPE	300x175x1	---	42	
10	Total weight	TBD				



10 Precautions for Use of LCD Modules

a) Handling Precautions

- i. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- ii. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- iii. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- iv. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- v. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:
 - Isopropyl alcohol
 - Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
 - Ketone
 - Aromatic solvents
- vi. Do not attempt to disassemble the LCD Module.
 - vii. If the logic circuit power is off, do not apply the input signals.
 - viii. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - 10.1.8.1 Be sure to ground the body when handling the LCD Modules.
 - 10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.
 - 10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - 10.1.8.4 The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

b) Storage precautions

- i. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
- ii. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0°C ~ 40°C Relatively humidity: ≤80%

- iii. The LCD modules should be stored in the room without acid, alkali and harmful gas.

c) Transportation Precautions

- i. The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.