SPECIFICATION
FOR
APPROVAL

( ) Preliminary Specification
(●) Final Specification

Title	**Customer Approval Sheet for Titan**

Customer	**Lenovo**
Part Number	SD68C74145

SUPPLIER	**Holitech**
MODEL	HTF065H035
Version	**A**

SIGNATURE	DATE

Please return 1 copy for your confirmation with your signature and comments.

APPROVED BY	DATE

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SCOPE

The purpose of this document is to provide a better understanding of Motorola, Inc.'s requirements for Organic Light Emitting Diode (OLED) Displays to suppliers. Its goal is to clarify quality control procedures and components specifications, so that suppliers ship only 100% acceptable material to Motorola.
This document contains specific electrical, optical, mechanical, environmental, packaging, and general Motorola manufacturing, quality, and qualification requirements.

APPLICABLE DOCUMENTS

12M80967A78 Motorola Supplier Material Quality Control
12G13933A01 Motorola Receiving Barcode Specification
12G13933A12 Component Temperature Requirements to Support “Pb-Free” Solder Assembly (if applicable)
12S10601A Packaging Requirements for Inbound Shipments to Motorola
12G02897W18 Motorola Controlled and Reportable Materials Disclosure
12M05053A65 Purchased Material Change Notification Procedure
12M09192A78 MOTOROLA PROCESS CHANGE NOTIFICATION PROCEDURE
71014125001 MOTOROLA SCT GUIDELINES FOR FPC TESTING AND VALIDATION REQUIREMENTS
71014011001 DISPLAY FLEX FABRICATION NOTES
MBG-S-PQM-061 Motorola Cosmetic Specification for Molded and/or Decorated Plastic Surfaces and Lenses for Handheld Products
12G13933C77 Qualification Procedure for LCD Displays
12M09192A78 Motorola PCS Process Change Notification Procedure
12M09195A44 LCD Mechanical Strength 4-Point Bending Test Method
12M09195A47 Display Module Design Validation Test
12M09195A43 Display Limit Sample Setup (only if applicable)

01019576 Display and Lens Module Assembly ME Drawing
72014110001 Display Module Assembly ME Drawing

CAUTION: This specification cannot be distributed to parties outside of Motorola Mobility without first having on file a signed Non-Disclosure Agreement.

If this part does NOT comply with the ESD, Latch-up, or any stress tests as outlined in 12G13933C77, the following note(s) are required to be added.

CAUTION: This device does not meet all the reliability stress test requirements according to Motorola Mobility ALT test conditions at the product level. Testing conditions in ALT at product level may have wider temperature ranges compared with the conditions that are specified in this document.

WARNING: IC's on this product are inherently static sensitive devices. As a result, extreme caution should be used when handling these parts. Every possible precaution should be taken in the manufacturing process to insure that any AMOLED display is not exposed to any static voltages.

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REQUIREMENT TO 12G13933C77

- This item must be qualified according to the requirements in 12G13933C77.
- Cpk data acquisition:
    - [ ] If this box is checked, Calculate Cp/Cpk on all specified parameters per Motorola 12M80967A78.
    - [✔] If this box is checked, Calculate Cp/Cpk on "[X]" and <ST> parameters only per Motorola 12M80967A78.

DESCRIPTION

This display is a color Active Matrix Organic Light Emitting Diode display (AMOLED) of glass construction with White pixels on a Black background. The display consists of 1080 (RGBG - Diamond) x 2340 pixels (sub pixel rendered) with a color depth of 16.6 M colors (24 bpp). The display interface is 1 MIPI channel with four DSI lane. The touch interface is via I2C.

This display module is constructed of

- The Organic Light Emitting Diode Display Glass consisting of the top glass plate, top circular polarizer organic material, and LTPS backplane containing the pixel transistors.
- Chip-on-Flex (COF) with the driver (“chip”) located at bottom front of panel.
- FPC with the necessary passive/active components.
- Tearing Effect output signal
- Display has 1/3 RAM. (1080x2340x24) / 3 = 20,217,600 virtual bits

Note: This platform display may be used on devices with operating systems such as Android, Linux and Java which are open source, and thus may be published and available to the general public. The information contained in any display interaction open source file will be the minimum required to successfully communicate and configure the display module.
Note: Do not ship any samples for any reason without MTPing the correct manufacturer/version numbers in registers A1h, DAh, DBh, DCh. If they are not programmed correctly, they will be rejected as defective. If you have a question regarding the correct programming. contact Motorola DDC immediately.

CHANGES TO PLATFORM DISPLAY

This document describes a platform display glass and driver intended for reuse in multiple display modules within Motorola. As a result, no element of the display design may change without the written permission from Motorola and an appropriate re-qualification of the display glass and driver. Furthermore, any requests or discussion for changes to the displays from within Motorola must be signed off by the following representatives on the Strategy Commodity Team: the head of the global display commodity team, the head of the Display Design Center.

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QUALIFICATION REQUIREMENTS

Cpk data must be presented to Component Technologies Engineering for the following process control parameters for initial qualification purposes. Data must be continuously collected for these process control parameters, and be made available to Motorola upon request for the prior 2 EPrs.
Definitions:
Box-X, [X]: Process Control Parameter: Parameter indicative of process control and capability of manufacturing component. Refer to 12M80967A78 for further details.
<ST>: Statistical Tolerance Parameter: Used where statistically valid samples are required for non Box-X, [X] parameters for module approval. Refer to 12M80967A78 for further details.

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RECORD OF REVISIONS

Revision No.	Revision Date	Page	Description
A	4-7		**First release**

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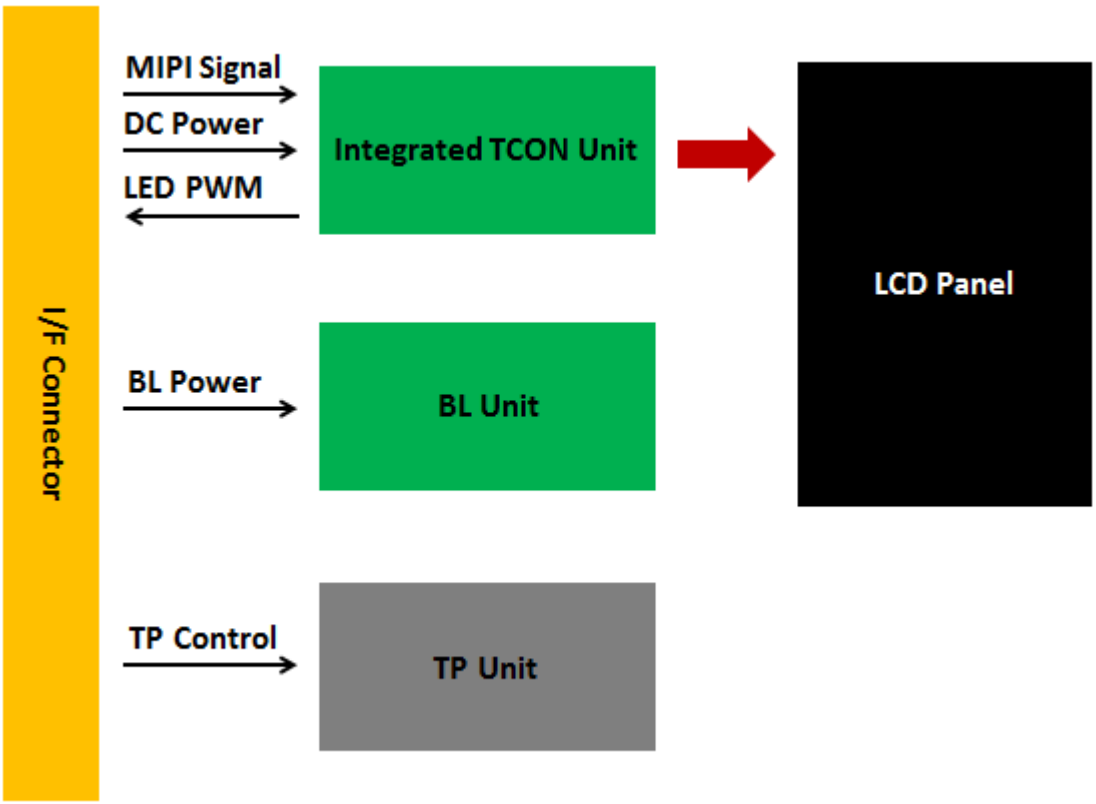
1-1. GENERAL DESCRIPTION

Block Diagram



Features

The HTF065H045 is a total solution which direct bonding TFT-LCD module with a driver circuit, a back-light unit and touch sensor. The LCD resolution of a 6.517” contain is 720 x 1600 pixels.

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1-2. General Spec

No	Item	Specification	unit	Remark
1	Screen Size	6.517	inch	-
2	Active Area	67.93(H) x 150.96(V)	mm	-
3	Panel Size	69.73(H) x 155.66(V) x 0.3(D)	mm	-
4	Outline Dimension	70.13 (H)×156.76(V)×1.30 (D)	mm	w/o CG
5	Display Resolution	720RGB(H) x 1600(V)	pixel	-
6	Pixel Pitch	0.03145(H) x0.09435(V)	mm	-
7	Display Method	FFS	-	-
8	Display Mode	Normally Black	-	-
9	Display Color	16.7M Colors	-	8bit
10	Color Gamut	70% (Typ.)	%	NTSC CIE1931
11	Luminance	380 (min.)450 (Typ.)	nit	with Lens, center P
12	Contrast Ratio	1000 (Typ.)	-	center P
13	Viewing Angle	80/80/80/80 (TYP)	°	CR>10(U/D/L/R)
14	Pol Surface Treatment	≥2H	-	-
15	Weight	49.2	g	-
16	D-IC	HX83102-D01QPD1707-CP	-	-
17	Inversion Method	Column inversion	-	-
18	LED Q'ty	16pcs 8S2P (20mA/LED)	ea	String*Parallel
19	Power Consumption	PLCD 120mW(TYP)	mw	@White Pattern
		PBL 896mW(Min.) 960mW(Typ.) 1024mW(Max.)	Mw	@2lane Without Driver IC

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1-3. Key Part List(5pcs average data)

	item	Supplier	Spec/Size	Remark
Cell	TFT Glass	MANTIX	69.73(W) x 155.66 (H) x 0.15 (Thickness) mm	
	C/F Glass	MANTIX	69.73(W) x 153.16(H) x 0.15 (Thickness) mm	
	Upper Pol	SB	T4-0625TJ3A24(SAP17)69.63 x 152.51x 0.078 mm	
	Lower Pol	SB	TFT □□ /SB152.86×69.73×0.105/ □□□ 90º/ IN/ □□	
	UV Glue/Tuffy	HITACHI	F-4200EB-75	
	D-IC	Himax	HX83102-D01PPD1707-CP	
	ACF(COG)	HITACHI	ACF/ □□ /AC-838B-14/L100m×W1.2	
	ACF(FOG)	HITACHI	ACF/AC-7813KM-25/0.8×100M	
	COG Ass'y	HLT	69.73(W)*155.66(H)*0.3(T)mm	
FPCA	FPC	HLT	40.41(W)*121.63(H)*0.13(T)mm	
	EMI coating	FB	HSF6000-2	
	Main Connector	Panasonic	SD_5055514020	
	LED lightbar CNT	-	-	
	Insulation Tape	FY	FY-JMGWJ05	
	Conductive Tape	FY	FY518	
	Release film on conductive tape	-	-	
	CNT Stiffener	HLS	SUS304 3/4H T=0.20mm	
	FPC Ass'y	HLT	FPC-HTF065H035-A2	
BLU	B/W tape	Sekisui	3806BHT=0.06mm	
	Upper Prism	Veitch	V-LN243Q4 T=0.096mm	
	Lower Prism	Veitch	V-LS242Q4 T=0.067mm	
	Diffuser Sheet	Changsong	CS189 T=0.055mm	
	LGP	Mitsubishi	TR1501A T=0.337mm	
	Reflector	3M	75W28 T=0.080mm	
	Mold frame	ALENG	SUS304 3/4H+PC5000A	
	LED	Suijing	SJ-S304ZW10(0.43T)	
	FPC Glue	Sekisui	3808BWH-D2 T=0.085mm	
	FPC	RCCT/Hayner Taixing	PI+ED copper	
	BLU Ass'y	HH	BLD-HTF065H035-A0	

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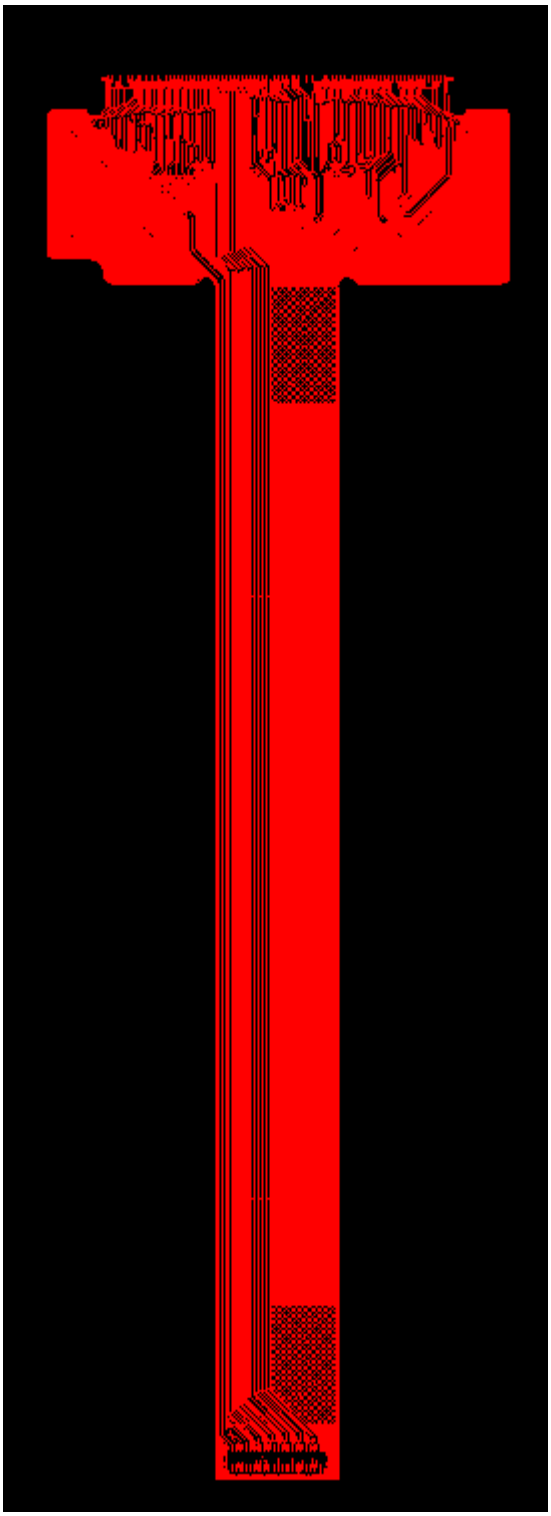
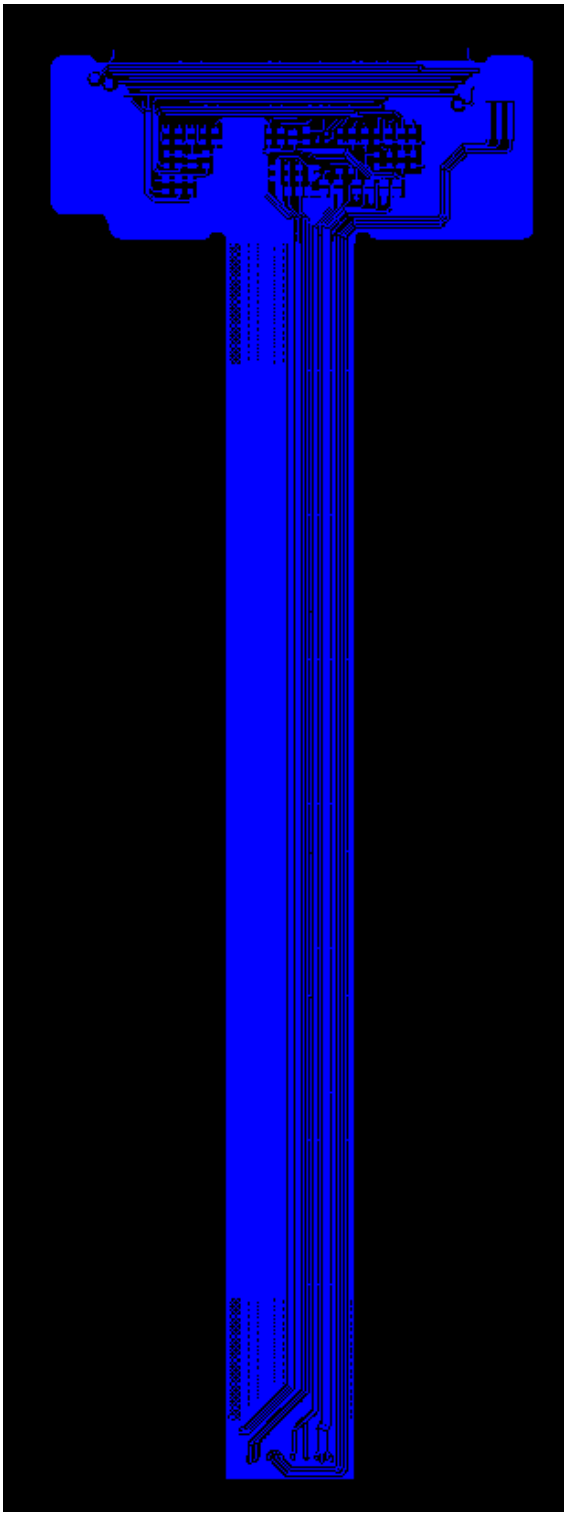
1-3-1. FPCA Gerber/Layout and Schematic Diagram

Top



Bottom



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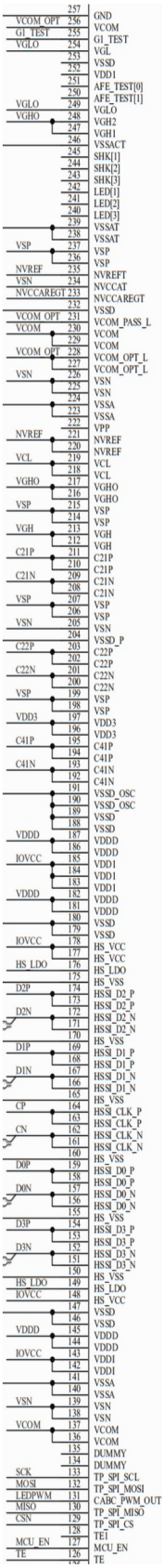
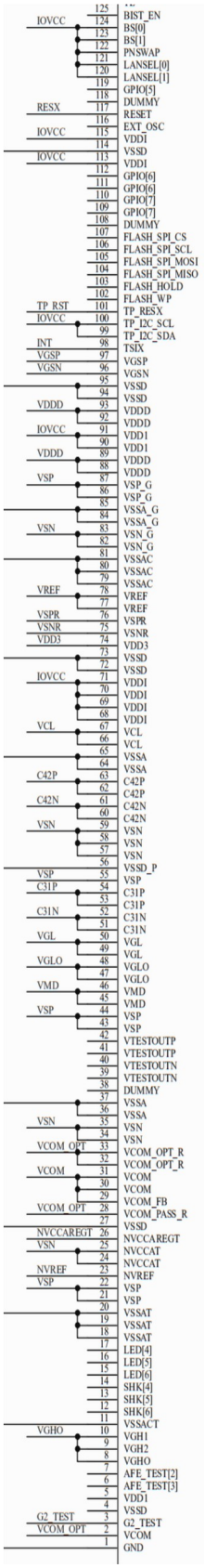
1-3-2. FPC Pin Assignment





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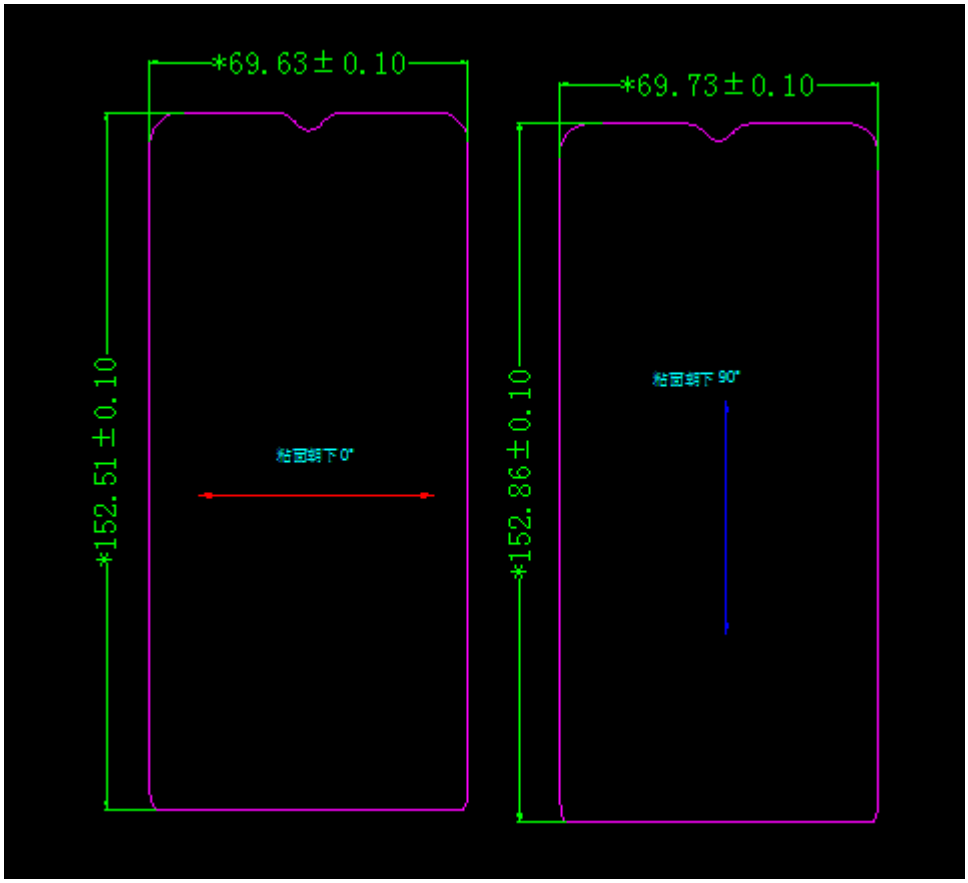
1-3-3. Pol General Spec

UP POL **DOWN POL**



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1-4. Change List

	No.	Reason	Change Details		Remarks
			Before	After	
H/W change	1				
	2				
	3				
Design Change	1				
S/W change	1	Improve gamma	The code is default	Change register of gamma	
	2				

Remarks:
1. H/W change includes all materials, components, label etc.
2. Design change includes size, position etc.
3. S/W change includes initial code etc.

Please pay attention that this list is just a summary, an individual Design Change List which contain much more information is also needed

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2-1. Absolute Maximum Ratings

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Table 2.1 Absolute Maximum Ratings

Item	Symbol	Value		Unit	Notice
		Min	Max		
Power Supply Voltage 1	IOVCC	1.65	1.95	V	
Power Supply Voltage 2	VSP	4.5	5.7	V	
Power Supply Voltage 3	VSN	-4.5	-5.7	V	

Note1: The maximum applicable voltage on any pin with respect to 0V.
Note2: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above.

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3-1. ELECTRICAL CHARACTERISTICS

Table 3.1 Electrical Characteristics Of TFT-LCD Module

(AVDD=4.5V~6.6V, AVEE=-4.5V~-6.6V, VDDI=1.65V~3.6V, Ta=-30℃~70℃)

ITEM		SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
Power Supply of I/O		VDDI	1.65	1.8	1.95	V	
Power Supply of Analog		AVDD	5.3	5.5	5.7	V	
Power Supply of Analog		AVEE	-5.3	-5.5	-5.7	V	
Logic High/Low Input Voltage	H Level	V_{IH}	0.7*VDDI	-	VDDI	V	
	L Level	V_{IL}	VSS	-	0.3*VDDI	V	
Logic High/Low Output Voltage	H Level	V_{OH}	0.8*VDDI	-	VDDI	V	I_{OH}=-1.0mA
	L Level	V_{OL}	VSS	-	0.2*VDDI	V	I_{OL}=+1.0mA
LCD power consumption		PLCD	-	120	130	mW	@White Pattern

Note: Recommend register setting is base on typical power setting

3-2. Logic Power Consumption

ITEM	SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
LCD power consumption	PLCD	-	120	130	mW	@White Pattern

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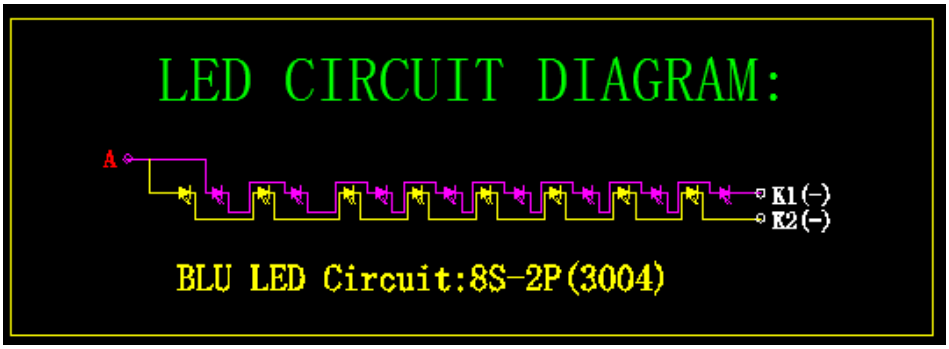
3-3. BACK LIGHT UNIT

3-3-1 The edge-lighting type of back light unit consists of 21 LEDs which is connected in serial.

Table 2-3-1 Electrical Characteristics Of Back Light Unit

Parameter	Symble	Conditions	Min	Typ	Max	Units	Note
LED forward Current	ILED	-	-	20	-	mA	
LED forward Voltage		ILED=20mA	2.8	3.0	3.2	V	
Power Consumption		IF=40mA	896	960	1024	mW	@2lane Without Driver IC

Number of LED: 16pcs, LED current: 20mA@1pcs
Circuit of LED:



3-3-2 LED Rank

LED color piece □ UFZ single □ UFG+UEFmixed

LED brightness grade □ 33&34 grade mixed

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3-4. LCD INTERFACE CONNECTIONS

Connector: 5055514020 **Table 3.4.1 LCD Connector Pin Configuration**

PIN	SYMBOL	PIN	SYMBOL
1	GND	21	IOVCC
2	SCLK	22	RESET
3	SMOSI	23	TE
4	MISO	24	PWM
5	CS	25	GND
6	GND	26	D2_P
7	MCU_RESET	27	D2_N
8	I2C_SDA(NC)	28	GND
9	I2C_SCL(NC)	29	D1_P
10	T_INT	30	D1_N
11	NC	31	GND
12	NC	32	CLK_P
13	LED_C2	33	CLK_N
14	LED_C1	34	GND
15	LED_A	35	D0_P
16	NC	36	D0_N
17	NC	37	GND
18	VSN(-6V)	38	D3_P
19	VSP(6V)	39	D3_N
20	NC	40	GND

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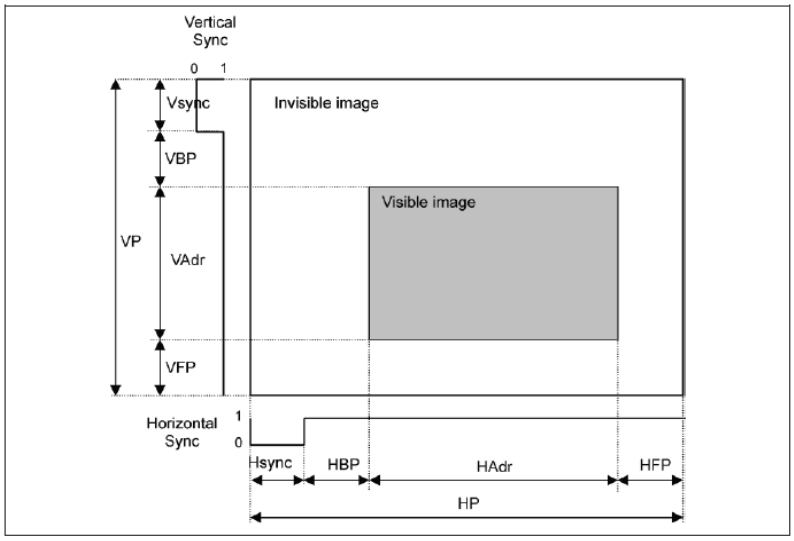
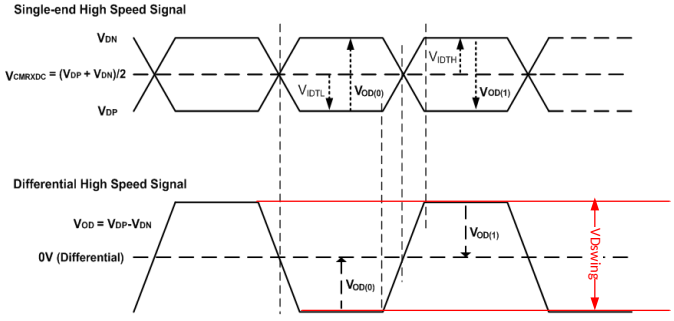
3-5. SIGNAL TIMING SPECIFICATIONS

ITEM			SYNBOL	Timing	UNIT
LCD	Frame Rate		-	60	Hz
Timing	DCLK	Frequency	fCLK	84	MHz
		Period	Tclk	11.90	ns
	Horizontal	Horizontal total time	tHP	775	t_{CLK}
		Horizontal Active time	tHadr	720	t_{CLK}
		Horizontal Pulse Width	tHsync	9	t_{CLK}
		Horizontal Back Porch	tHBP	29	t_{CLK}
		Horizontal Front Porch	tHFP	17	t_{CLK}
	Vertical	Vertical total time	tvp	1800	t_H
		Vertical Active time	tVadr	1600	t_H
		Vertical Pulse Width	tVsync	2	t_H
		Vertical Back Porch	tVBP	12	t_H
		Vertical Front Porch	tVFP	186	t_H
Differential Swing			VDswing	-	mV
Bit Rate			TX SPD(MBPS)	512	Mbps
Pixel Fomat				24(888)	Data bit/pixel
Lane				4	Lane

※Please refer to initial code





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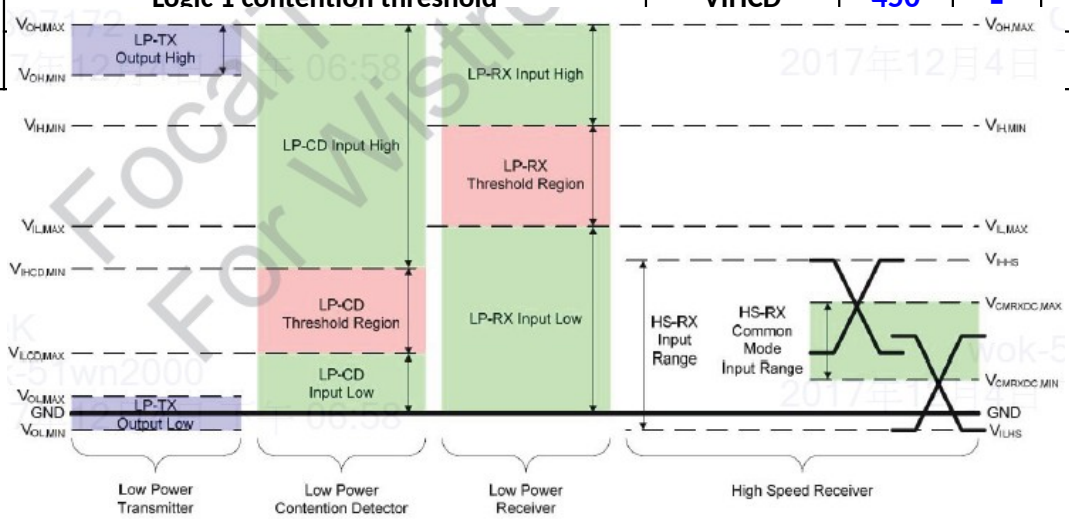
3-6. MIPI Data&CLK Line Impedance Test Result

(1) MIPI Interface Timing Sequence

(a) MIPI interface DC characteristic

Item		Parameter	Min.	Typ.	Max.	Unit
LP_TW	Thevenin output high level	VOH	1.1	1.2	1.3	V
	Thevenin output low level	VOL	-50	-	50	mV
	Output impedance of LP transmitter	ZOLP	110			ohm
HS_RX	Common-mode voltage HS receive mode	VCMRX(DC)	70	-	330	mV
	Differential input high threshold	VIDTH			70	mV
	Differential input low threshold	VIDTL	-70			mV
	Single-ended input high voltage	VIHHS	-	-	460	mV
	Single-ended input low voltage	VILHS	-40	-	-	mV
	Single-ended threshold for HS termination enable	VTERM-EN			450	mV
	Differential input impedance	ZID	80	100	125	Ω
LP_RX	Logic 1 input voltage	VIH	880	-	-	mV
	Logic 0 input voltage. not in ULPState	VIL	0	-	550	mV
	Input hysteresis	VHYST	25	-	-	mV
LP_CD	Logic 1 contention threshold	VIHCD	450	-	-	mV
					200	mV



MIPI DC Diagram

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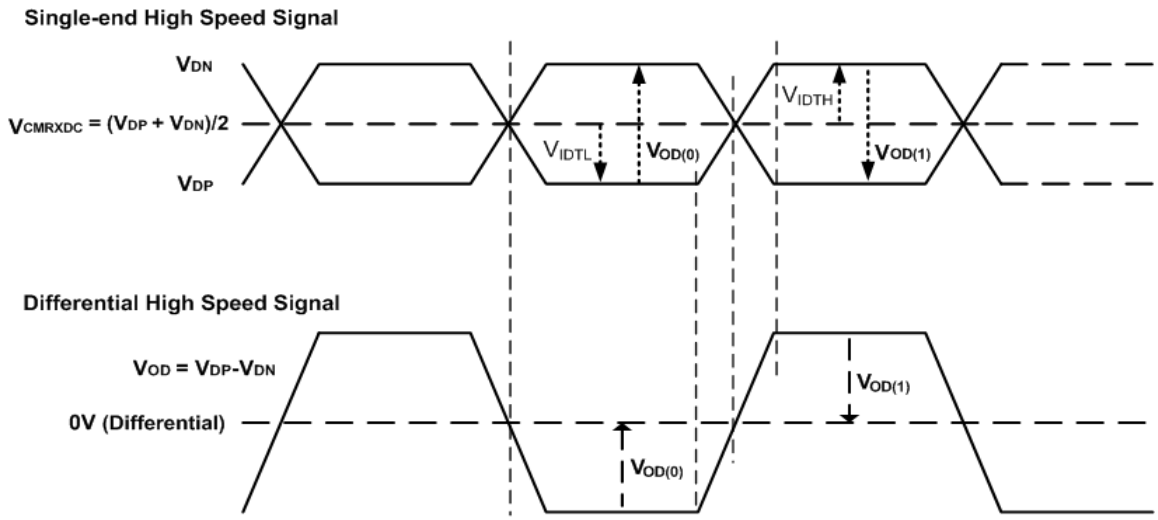


Signal-ended and Resulting Differential HS Signals Diagram

(b) MIPI data to clock timing definitions

Clock Parameter	Symbol	Min	Typ.	Max.	Unit
UI instantaneous	UI INST	-	-	12.5	ns
Data to Clock Setup Time [Receiver]	T SETUP[RX]	0.15	-	-	UI INST
Clock to Data Hold Time [Receiver]	T HOLD[RX]	0.15	-	-	UI INST

□ Note □

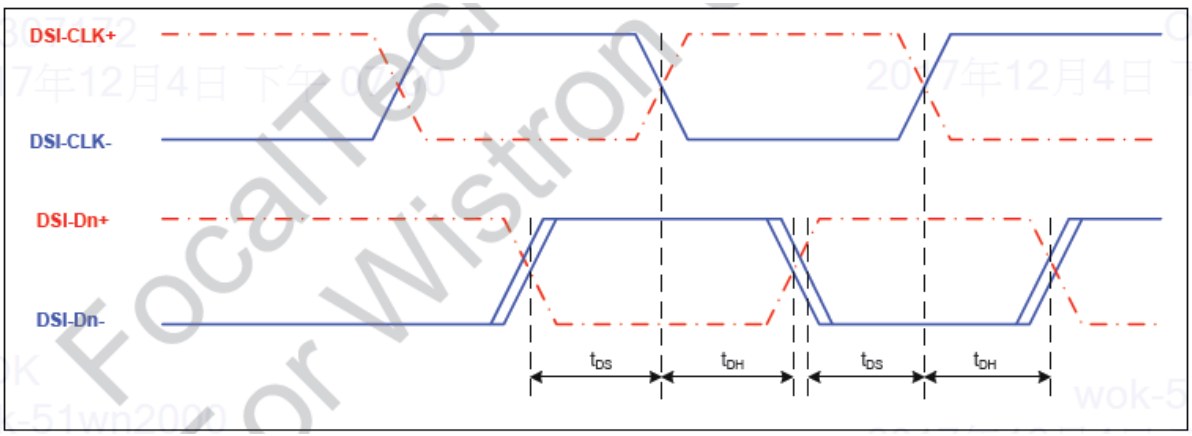
*1) This max value corresponds to a minimum 80 Mbps data rate per lane

*2) The minimum UI shall not be violated for any single bit period, i.e., any DDR half cycle within a data burst.

*3) Total silicon and package delay budget of 0.3 UIINST

4) Total setup and hold window for receiver of 0.3 UIINST

*5) T SETUP[Rx] and T HOLD[RX] are only for RX without FPCB and connector and guaranteed by design.



MIPI data to clock timing definitions

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(2)TE

The Tearing Effect signal is described below:

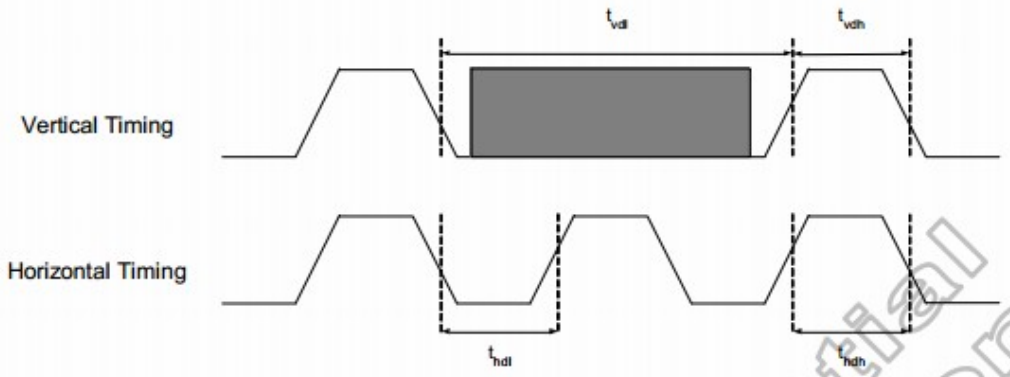

Figure 5.3: Tearing effect output line –tearing effect line timing

Idle Mode Off

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical timing low duration	tvdl	-	-	-	H
Vertical timing high duration	tvdh	2	-	-	H
Rise time	tr	-	-	15	ns
Fall time	tf	-	-	15	ns

Note: (1) The timings in Table 5.1 1 apply when MADCTL ML=0 and ML=1

Table 5.1: AC characteristics of tearing effect signal

The signal's rise and fall times (**tf, tr**) are stipulated to be equal to or less than 8.68ns.

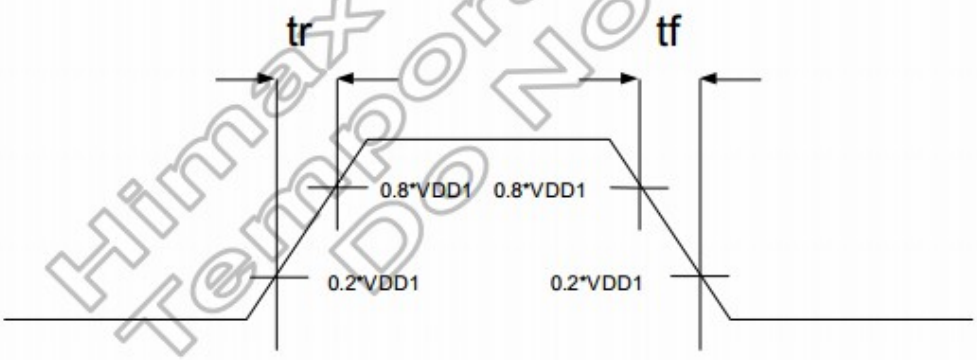

Figure 5.4: Tearing effect output line–definition of tf, tr

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3-7. Power On/Off Sequence

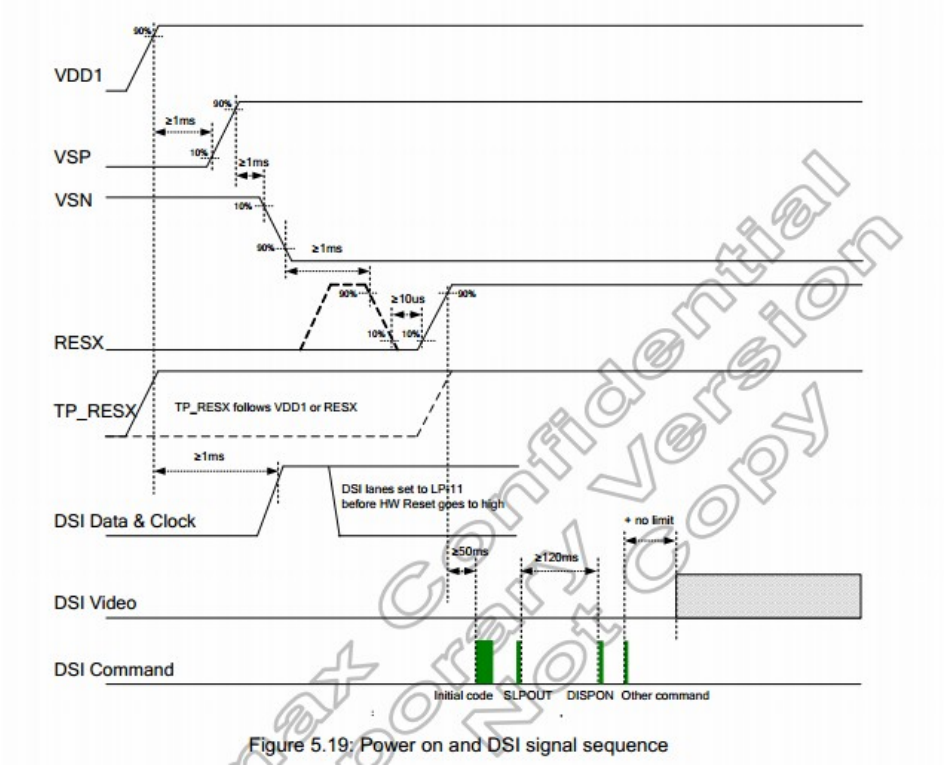

Figure 5.19: Power on and DSI signal sequence

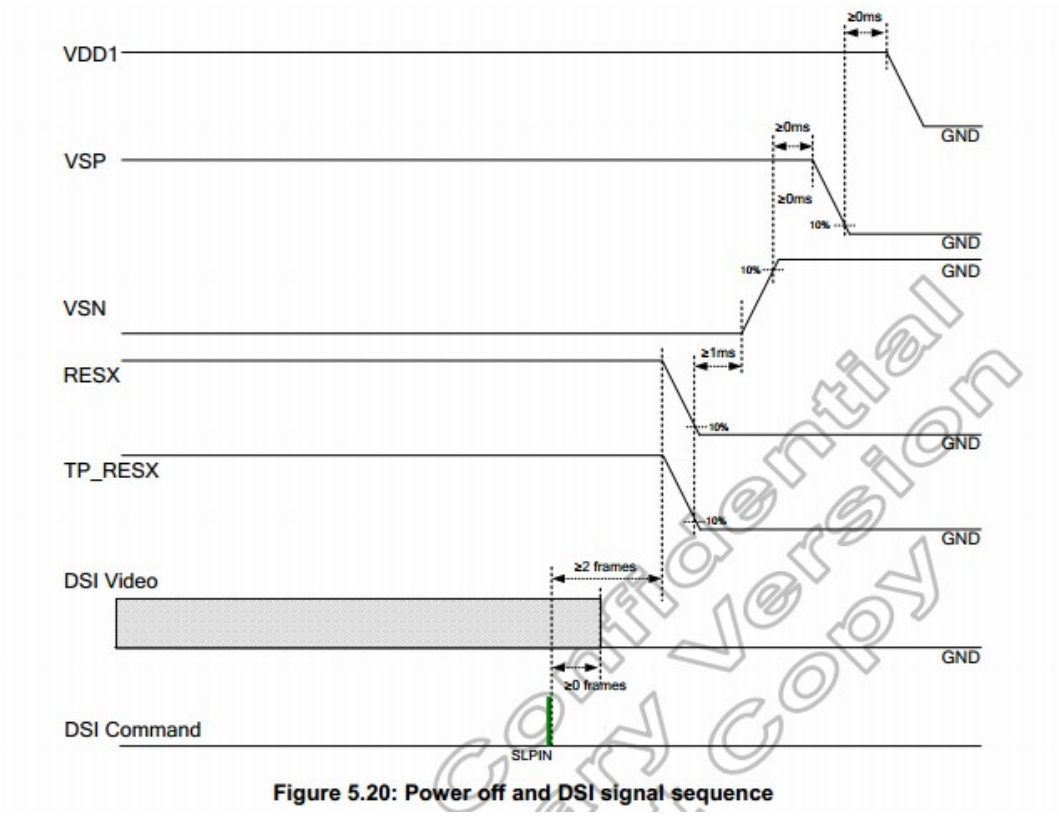

Figure 5.20: Power off and DSI signal sequence

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3-8. Software Flow

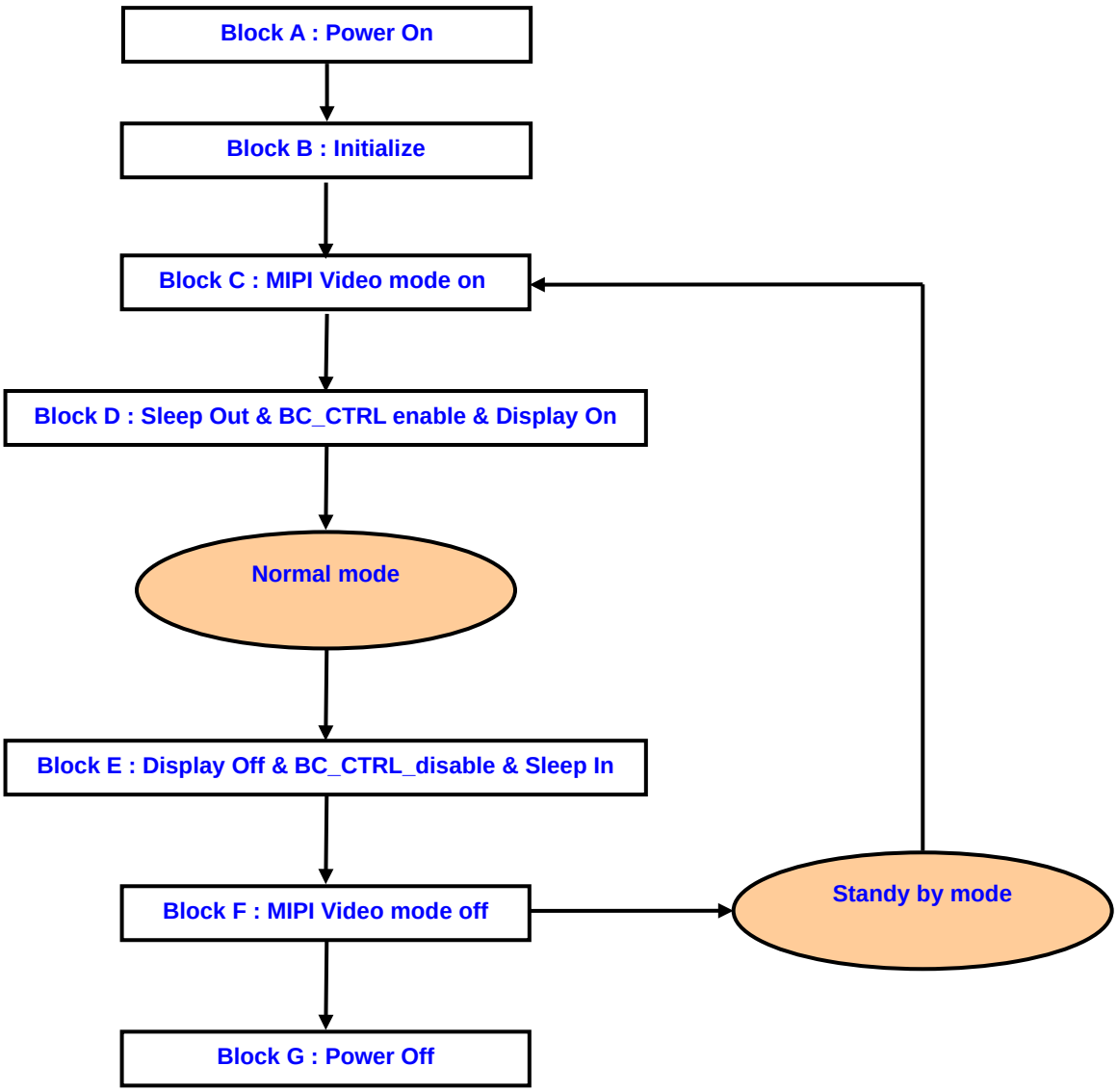

Fig 3.7 Software Flowchart

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3-9. Initial Code

```
/* Driver_RB9H_BK0 */
0x03, 0xB9,
0x83, 0x10, 0x2D,

/* Driver_RB1H_BK0 */
0x0B, 0xB1,
0x22, 0x44, 0x27, 0x27, 0x32, 0x52, 0x57, 0x39, 0x08, 0x08,
0x08,

/* Driver_RB2H_BK0 */
0x0E, 0xB2,
0x00, 0x00, 0x06, 0x40, 0x00, 0x0E, 0xAE, 0x38, 0x00, 0x00,
0x00, 0x00, 0xF4, 0xA0,

/* Driver_RB4H_BK0 */
0x0E, 0xB4,
0x01, 0x58, 0x01, 0x58, 0x01, 0x58, 0x03, 0x58, 0x03, 0xFF,
0x01, 0x20, 0x00, 0xFF,

/* Driver_RCCH_BK0 */
0x01, 0xCC,
0x02,

/* Driver_RD3H_BK0 */
0x19, 0xD3,
0x00, 0x00, 0x00, 0x00, 0x00, 0x10, 0x00, 0x17, 0x00, 0x63,
0x37, 0x0E, 0x0E, 0x00, 0x00, 0x32, 0x10, 0x08, 0x00, 0x08,
0x32, 0x16, 0x4E, 0x06, 0x4E,

/* Driver_RC9H_BK0 */
0x04, 0xC9,
0x04, 0x0C, 0xB2, 0x01,

/* Driver_RD5H_BK0 */
0x2C, 0xD5,
0x24, 0x25, 0x18, 0x18, 0x19, 0x19, 0x18, 0x18, 0x18, 0x18,
0x18, 0x18, 0x18, 0x18, 0x18, 0x18, 0x18, 0x18, 0x06, 0x07,
0x04, 0x05, 0x18, 0x18, 0x18, 0x18, 0x02, 0x03, 0x00, 0x01,
0x20, 0x21, 0x18, 0x18, 0x18, 0x18, 0x18, 0x18, 0x18, 0x18,
0x18, 0x18, 0x18, 0x18,

/* Driver_RD6H_BK0 */
0x2E, 0xD6,
0x00, 0x09, 0x16, 0x1F, 0x28, 0x4B, 0x65, 0x6D, 0x74, 0x70,
0x89, 0x8D, 0x91, 0xA0, 0x9E, 0xA8, 0xB2, 0xC8, 0xC9, 0x65,
0x6D, 0x78, 0x7F, 0x00, 0x09, 0x16, 0x1F, 0x28, 0x4B, 0x65,
0x6D, 0x74, 0x70, 0x89, 0x8D, 0x91, 0xA0, 0x9E, 0xA8, 0xB2,
0xC8, 0xC9, 0x65, 0x6D, 0x78, 0x7F

/* Driver_RE0H_BK0 */
0x2C, 0xE0,


/* Driver_RE7H_BK0 */
0x04, 0xE7,
0xFF, 0x14, 0x00, 0x00,

0x01, 0xBD,
0x01,

/* Driver_RE7H_BK1 */
0x01, 0xE7,
0x01,
```

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```
0x01, 0xBD,
0x00,

0x01, 0xBD,
0x02,

/* Driver_RD8H_BK2 */
0x0C, 0xD8,
0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xF0, 0xFF, 0xFF, 0xFF, 0xFF,
0xFF, 0xF0,

0x01, 0xBD,
0x03,

/* Driver_RD8H_BK3 */
0x18, 0xD8,
0xAA, 0xAA, 0xAA, 0xAA, 0xAA, 0xA0, 0xAA, 0xAA, 0xAA, 0xAA,
0xAA, 0xA0, 0xAA, 0xAA, 0xAA, 0xAA, 0xAA, 0xA0, 0xAA, 0xAA,
0xAA, 0xAA, 0xAA, 0xA0,

0x01, 0xBD,
0x00,

/* Driver_RBAH_BK0 */
0x13, 0xBA,
0x70, 0x23, 0xA8, 0x93, 0xB2, 0xC0, 0xC0, 0x01, 0x10, 0x00,
0x00, 0x00, 0x0D, 0x3D, 0x82, 0x77, 0x04, 0x01, 0x04,

0x01, 0xBD,
0x01,

/* Driver_RCBH_BK1 */
0x01, 0xCB,
0x01,

0x01, 0xBD,
0x00,

/* Driver_RCBH_BK0 */
0x05, 0xCB,
0x00, 0x53, 0x00, 0x02, 0x59,

/* Driver_RBFH_BK0 */
0x07, 0xBF,
0xFC, 0x00, 0x04, 0x9E, 0xF6, 0x00, 0x5D,

0x01, 0xBD,
0x02,

/* Driver_RB4H_BK2 */
0x08, 0xB4,
0x42, 0x00, 0x33, 0x00, 0x33, 0x88, 0xB3, 0x00,

0x01, 0xBD,
0x00,

/* Driver_RD1H_BK0 */
0x02, 0xD1,
0x20, 0x01,

0x01, 0xBD,
0x02,

/* Driver_RB1H_BK2 */
0x03, 0xB1,
0x7F, 0x03, 0xF5,

0x01, 0xBD,
0x00, );
);
```

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3-10. IC General Spec and Size

3-10-1. IC General Description

Himax HX83102-D is an integrated chip of TFT display and "In-Cell" touch controller. It is designed to provide a single-chip solution that combines source driver control, gate driver control and power supply circuit.

HX83102-D supports MIPI DSI **(Display Serial Interface)** interface mode in TFT LCD driving.

Besides the display driving function, HX83102-D involves the capacitive touch screen control design with I2C interface. It supports touch screen of 576 sensing channels I/O. It also provides flexibility and selective functionality solution for the variety application of touch screen.

HX83102-D can be operated in low-voltage condition for the interface and integrated internal boosters that produce the liquid crystal voltage, breeder resistance and the voltage follower circuit for liquid crystal driver. In addition, It also supports various functions to reduce the power consumption of a LCD system via software control.

HX83102-D is suitable for any small portable battery-driven and long-term driving products, such as cellular phones, tablet and other mobile devices.

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3-10-2. Features

a. Display

- Single chip solution for TFT LCD display
- Resolution
  - Source resolution : 720, 640, 600 (pixels)
  - Gate resolution : NL, NL≦1600. Typical resolution : 1280, 1440, 1600
- Display color modes
  - Full color mode
    - 16.7M colors: 24 bpp, 8R8G8B
  - Reduced color mode
    - 262K colors: 18 bpp, 6R6G6B
    - 65K colors: 16 bpp, 5R6G5B
    - 8 colors: 3 bpp **(Idle mode)**

b. Display module

- Support 2160 source channel outputs
- Gate driver control signals for GIP
- Supports 1-dot / 2-dot / 4-dot / Column/ Zig-Zag inversion
- Output voltage level
  - Positive source output voltage: VSPR to VGSP
  - Negative source output voltage: VSNR to VGSN
  - Positive gate driver output voltage: VGHO (regulated from VGH)
  - Negative gate driver output voltage: VGLO (regulated from VGL)
  - VCOM: 0V to -4.0V, 10mV/step
  - VSPR: 3.1V~6.2V
  - VGSP: 0V~0.7V
  - VSNR: -3.1V~-6.2V
  - VGSN: 0V~-0.7V
  - VGHO: 7.3V~20V
  - VGLO: -5.3V~-18V

c. Display control interface

- Display interface types supported
  - MIPI-DSI **(Display Serial Interface)** interface
    - Support DSI Version 1.1
    - Support D-PHY version 1.1

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d. Input power

- Logic and interface power **(VDD1)** voltage: 1.65V to 1.95V
- Positive power **(VSP)** voltage: 4.5V to 6.5V
- Negative power **(VSN)** voltage: -4.5V to -6.5V
- OTP programming power **(VPP)** voltage: 8.5V ± 0.25V

e. Touch controller features

- Projective touch screen control
- Maximum 576 channels
- Multi-touch
- Auto noise filter
- Customized function design **(Embedded 32bit MCU)**
- External flash
- I^2C interface **(0x90 as default slave address)**

f. Miscellaneous

- Low power consumption
- GAS function when uncontrolled power off
- Temperature range: -40°C to +85°C
- On-chip OTP programming voltage generator
- OTP memory for initialization registers
  - 3 times MTP for VCOM and ID setting
- Image processing/enhancement
  - CABC **(Content Adaptive Brightness Control)**
  - CE **(Color Enhancement)**
  - SLR **(Sun Light Readability)**
  - Dynamic contrast enhancement
- FRM **(Free Running Mode)**
- Temperature sensor

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3-11. Power Consumption

Test Pattern	Average VDDIO [mA]	Average VSP [mA]	Average VSN [mA]
Black	17.088	6.868	8.572
White	16.184	7.054	8.752
Red	17.61	6.954	8.654
Green	17.598	6.956	8.652
Blue	17.588	6.956	8.652
App Menu	20.092	9.622	11.406
Tizu Map	19.092	9.662	11.49
Green/Magenta Vertical Stripe	17.066	7.088	8.78
Black/White Vertical Stripe	17.458	6.99	8.734
Green/Magenta 1 Dot Checker	22.544	12.424	20.04
Black/White 1 Dot Checker	22.898	15.088	22.192
Sleep In Mode	3.35mA	124.1uA	14uA

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4. OPTICAL CHARACTERISTICS

4-1. Optical Characteristics – Backlight 100%

Item		Symbol	Rating			Unit	Definition Condition	Remark
			Min.	Typ.	Max.			
Contrast (Center)		CR	800	1000	-	-	θ=0° Φ=0°	Note 1
Luminance of white (w/ CG) (Center)		YL	380	450	-	cd/m²	IF=40mA	-
Uniformity (25P)		δ WHITE	80	85	-	%	IF=40mA	Note 2
Response time (Rising + Falling)		TRT	-	30	35	ms	θ=0° Φ=0°	Note 3
NTSC		CG	65	70	-	%	θ=0° Φ=0°	CIE1931
Color chromaticity	White	Suv	0	-	0.31	-	θ=0° Φ=0°	D73: (u', v') = (0.1943, 0.4604)
		huv	0	-	360			
		Suv	0	-	0.25			
		huv	180	225	270			
	Red	Suv	3.26	3.36	3.46			
		huv	13.8	14.8	15.8			
	Green	Suv	1.49	1.59	1.69			
		huv	118	120	122			
	Blue	Suv	4.17	4.42	4.67			
		huv	266.6	269.6	272.6			
Viewing angle	Hor.	θL	-	80	-	Deg.	CR≥10 At center	Note 4
		θR	-	80	-			
	Ver.	ΦT	-	80	-			
		ΦB	-	80	-			
Cross Talk		-	-	-	2	%	-	Note 5
Gamma		-	1.9	2.2	2.5	-	-	240 2.2 ± 0.4
Flicker		-	-	-	-28	db	-	Note 6

4-2. Cell&BLU Optical Characteristics

Parameter	Typ	Unit	Remarks
Upper Pol Trans.	43	%	
Lower Pol Trans.	43	%	
Panel Trans.	3.85	%	
BLU Luminance	9200	Cd/m²	Center
BLU Luminance Uniformity	85	%	Note1,7

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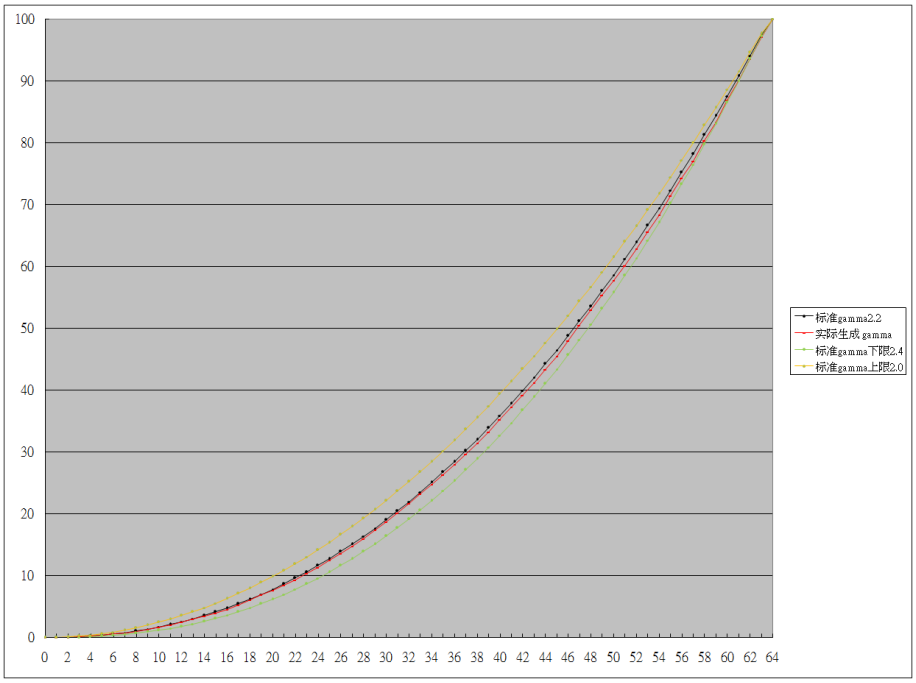
4-3. Gamma/Color Coordinate Uniformity/CE Function/CABC Function

4.3-1 Gamma Curve



4.3-2 Color Coordinate Uniformity

Display Color (WHITE) @ 25 C				
NO	u'	v'	x	y
#1	0.1957	0.4667	0.3087	0.3271
#2	0.1949	0.4666	0.3076	0.3272
#3	0.1961	0.4672	0.3096	0.3278
#4	0.1947	0.4685	0.309	0.3303
#5	0.1953	0.4657	0.3073	0.3256
#6	0.196	0.4675	0.3098	0.3283
#7	0.1963	0.4715	0.3136	0.3248
#8	0.1951	0.4702	0.3109	0.323
#9	0.1966	0.469	0.3117	0.3286
#10	0.1939	0.4665	0.3062	0.3274
#11	0.1955	0.4683	0.3098	0.3297
#12	0.1958	0.4712	0.3107	0.3284
#13	0.1958	0.47	0.3107	0.3271
#14	0.1952	0.4697	0.3106	0.3301
#15	0.1964	0.4672	0.3099	0.3276
#16	0.1958	0.4665	0.3086	0.3267
#17	0.196	0.4659	0.3083	0.3258
#18	0.1956	0.4658	0.3077	0.3256
#19	0.1955	0.4653	0.3072	0.325
#20	0.1955	0.4665	0.3082	0.3269
#21	0.1962	0.4657	0.3083	0.3254
#22	0.1953	0.4693	0.3104	0.3304
#23	0.1942	0.4673	0.3072	0.3286
#24	0.1946	0.4673	0.3077	0.3284
#25	0.1947	0.4676	0.3081	0.3289
AVE	0.1955	0.4677	0.3091	0.3274
MIN	0.1939	0.4653	0.3062	0.3230
MAX	0.1966	0.4715	0.3136	0.3304

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4.3-3 CABC

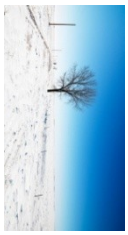
Optical Machine			
UI Mode	**Snow**	**Table**	**Firework**
Target PWM %	100%	94.00%	90%
Sampe #1 PWM %	94.20%	88.90%	84.90%
Sampe #2 PWM %	94.20%	88.80%	84.70%
Sampe #3 PWM %	94.10%	88.80%	84.70%
Sampe #4 PWM %	94.10%	88.70%	84.80%
Sampe #5 PWM %	94.20%	88.80%	84.80%

Movie Mode	**Snow**	**Table**	**Firework**
Target PWM %	97%	85%	75%
Sampe #1 PWM %	91.50%	80.10%	70.50%
Sampe #2 PWM %	91.70%	79.80%	70.50%
Sampe #3 PWM %	91.70%	79.90%	70.50%
Sampe #4 PWM %	91.50%	80.10%	70.50%
Sampe #5 PWM %	91.70%	80.00%	70.50%

Pattern List:

Snow

Table



Firework

CABC Measurement

This display has dynamic backlight control function to provide PWM feedback signal to external LED drivers to throttle LED currents in order to save power. This is an advanced function where the brightness of the backlight is automatically adjusted in accordance with the average picture level of the input image data by changing the PWM output.

The three specified images with CABC turned ON should give the following PWM feedback with a tolerance of +/-2%, not only in UI mode, but also movie mode.

*** No noticeable brightness drop and bending should be seen when CABC is ON.**

*** If there's a significant number of pixels are on light gray/ white, PWM adjustment should not be very aggressive.**

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4-4. LCD Spectrum and BLU Spectrum

LCD

R	x	(0.641)	(0.661)	(0.681)
	y	(0.301)	(0.321)	(0.341)
G	x	(0.217)	(0.237)	(0.257)
	y	(0.556)	(0.576)	(0.596)
B	x	(0.118)	(0.138)	(0.158)
	y	(0.088)	(0.108)	(0.128)

$\theta = \phi = 0°$

BLU

X	0. 265	0. 28	0. 295
Y	0. 24	0. 255	0. 27

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Test Conditions
-Measurement should be executed in a stable, windless, and dark room.
-Environment condition : Common air conditioner cleanness Ta=23±5℃ □ Humidity=60±15%
-Distance: 50cm
-Photo detector : BM-7A (Field 1°)

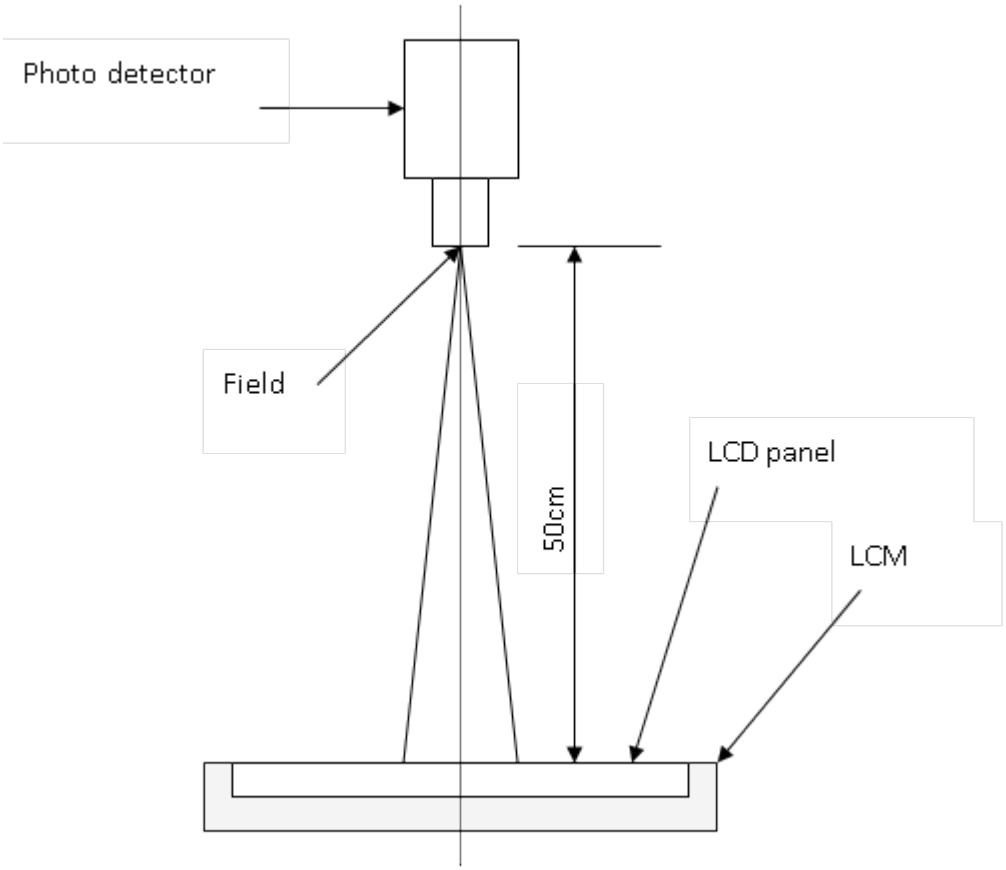

Fig 4.1. Optical Characteristic Measurement Equipment and Method

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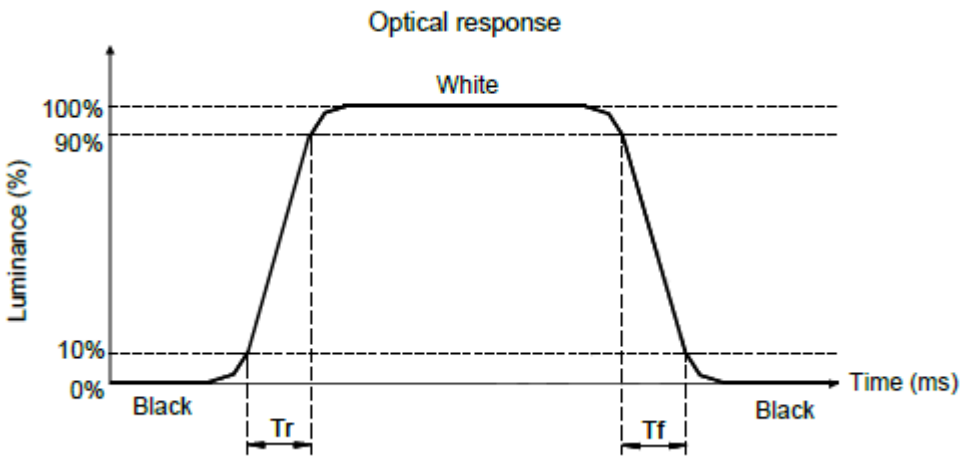
Note 1: Definition of contrast ratio:
CR = White Luminance (ON) / Black Luminance (OFF)

Note 2: δw = Minimum luminance of 25 point/Maximum luminance of 25 point

Uniformity Low Tier
To test for uniformity, the test area, which is 1/10 width and 1/10 height inside of the active area, is divided into 5(M) rows and 5(N) columns for the main display. The measurement spot is placed at the center of each box. 5 x 5 spots will be tested and the uniformity is calculated as the ratio of the maximum to minimum luminance. 2mm diameter spots will be tested

There should not be any visible hotspots, light streaking, Moire patterns, Newton rings and other visible artifacts.

Note 3: Definition of response time
The output signals of photo detector are measured when the input signals are changed from “black” to “white” (rising time) and from “white” to “black” (falling time), respectively. Definition of response time □
The response time is defined as the time interval between the 10% and 90% amplitudes.



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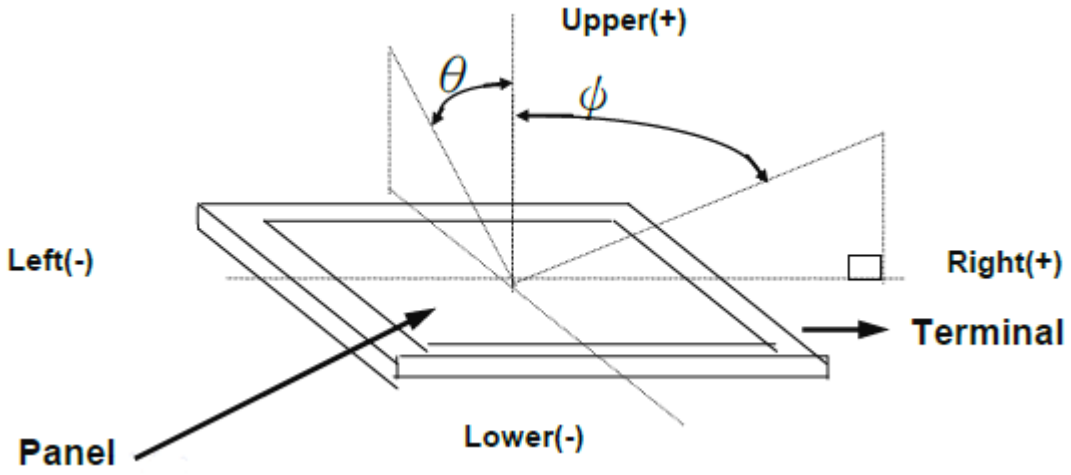
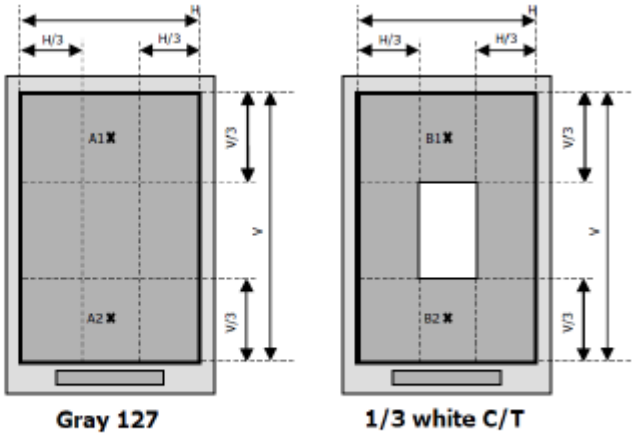
Note 4: Definition of Viewing Angle (θ □ Φ)



Note 5: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 6:

Flicker Pattern
(Frame Rate=60Hz)



Cross Talk Pattern

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5. MECHANICAL CHRACTERISTICS

The contents provide general mechanical characteristics for the model.
In addition the figures in the next page are detailed mechanical drawing of the LCD.

Item		Min	Typ.	Max	Unit	Notice
LCD Module Size	Horizontal(H)	70.03	70.13	70.23	mm	
	Vertical(V)	156.61	156.76	156.91	mm	
	Depth(D)	1.20	1.30	1.40	mm	Without FPC
Touch Panel Size	Horizontal(H)	72.56	72.61	72.66	mm	
	Vertical(V)	161.73	161.78	161.83	mm	
	Depth(D)	0.65	0.7	0.75	mm	
LCM with CG Size	Depth(D)	2.0	2.15	2.3	mm	Without FPC
LCM with Cover Glass Weight		48.2	49.2	50.2	g	

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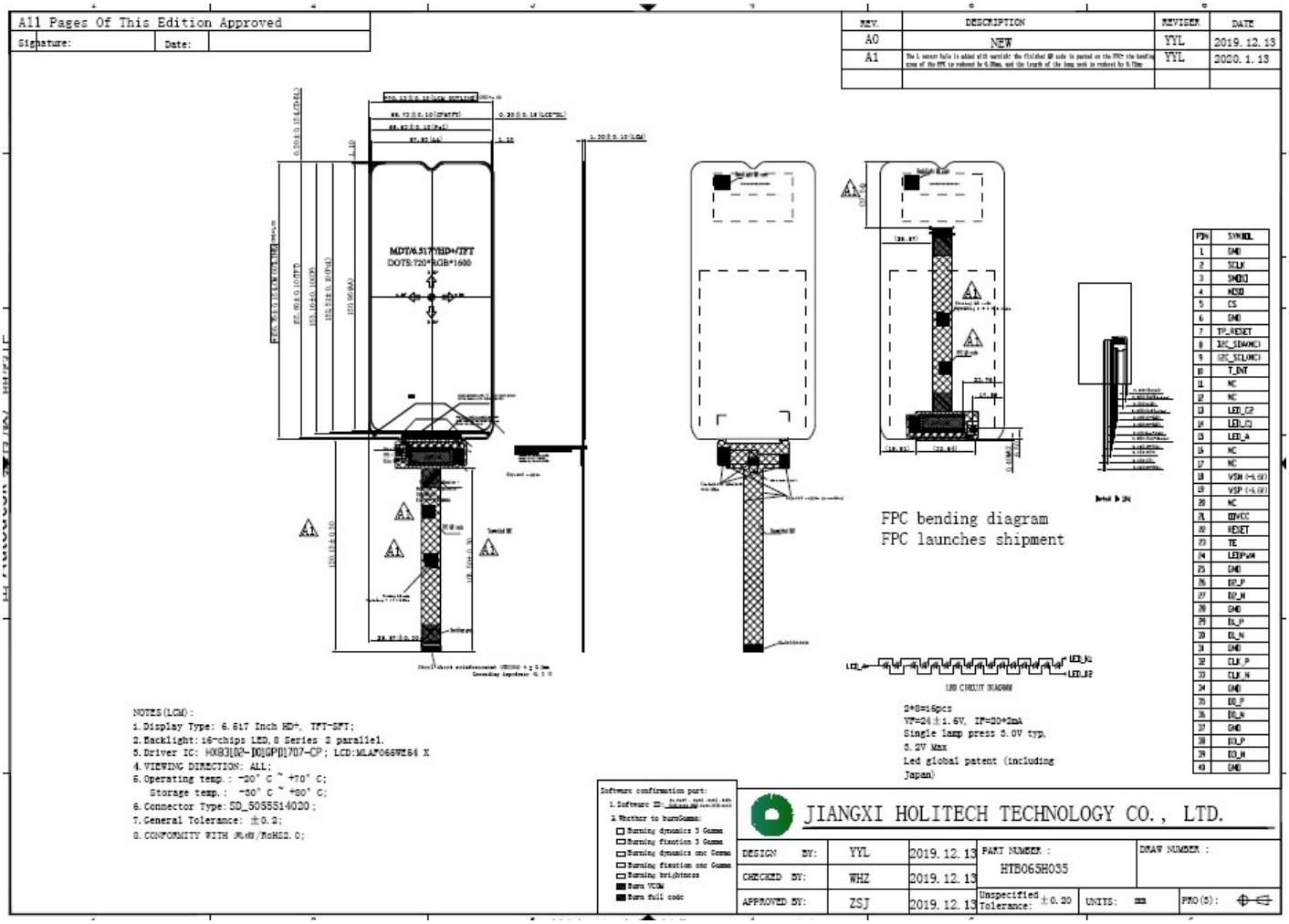
5.1 LCM Drawing



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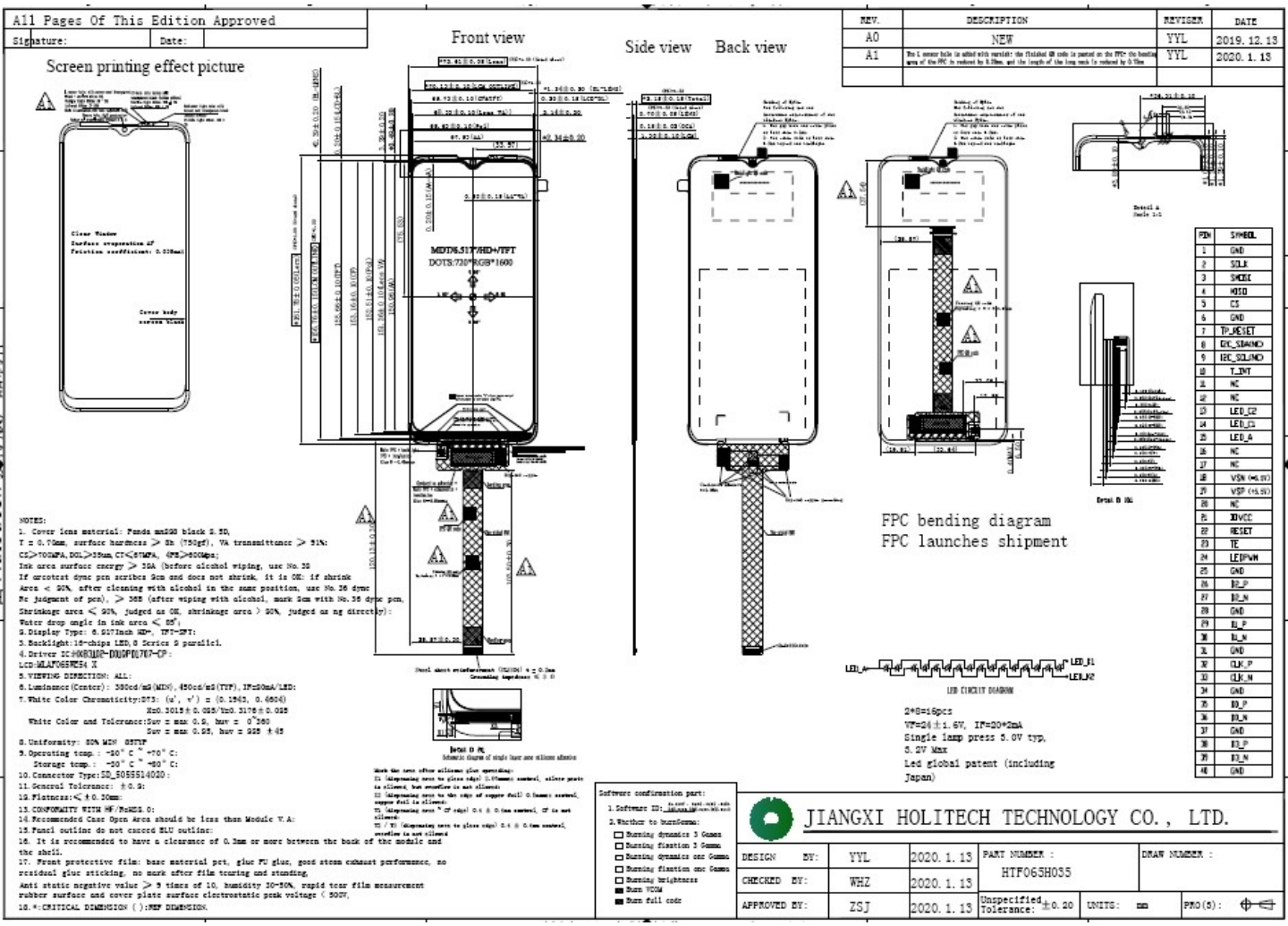
TP+LCM Drawing



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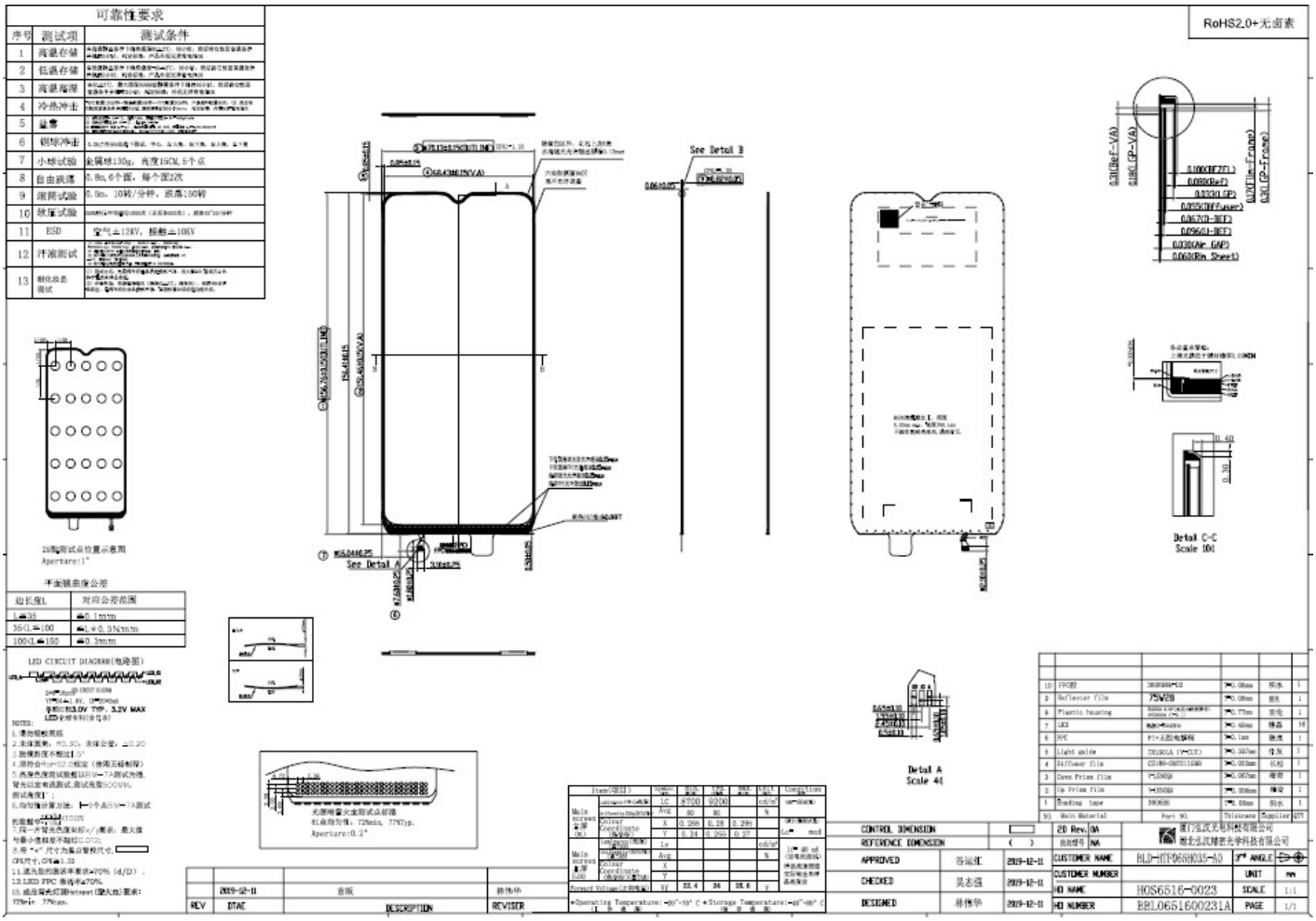
5.2-1 BLU Outline Dimension



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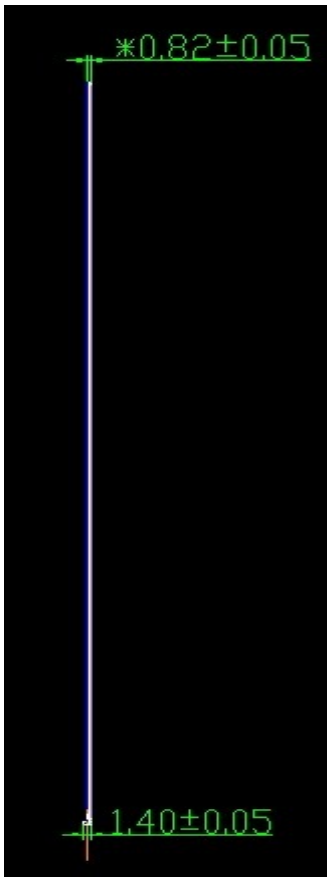
5.2-2 BLU Section Review



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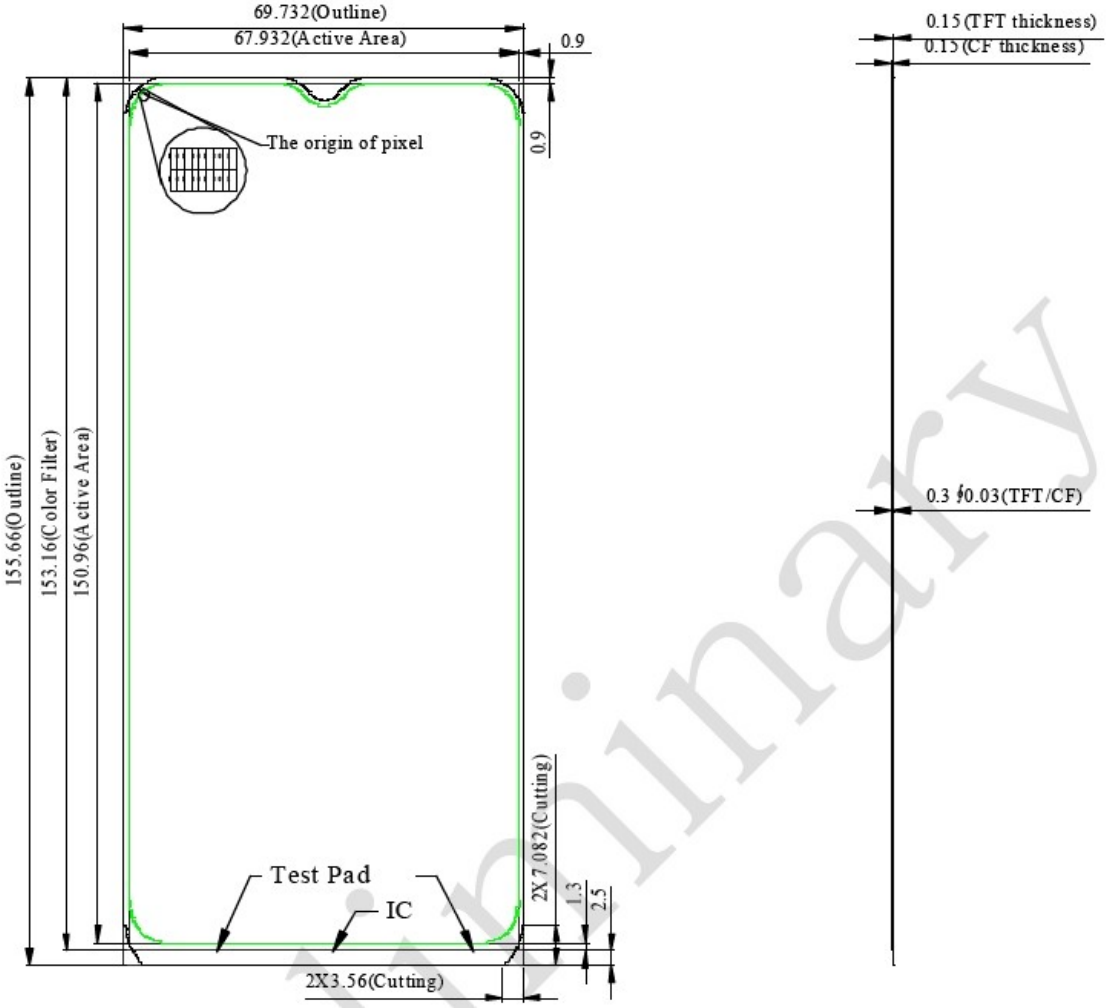
5.3 Panel Outline Dimension



Preliminary

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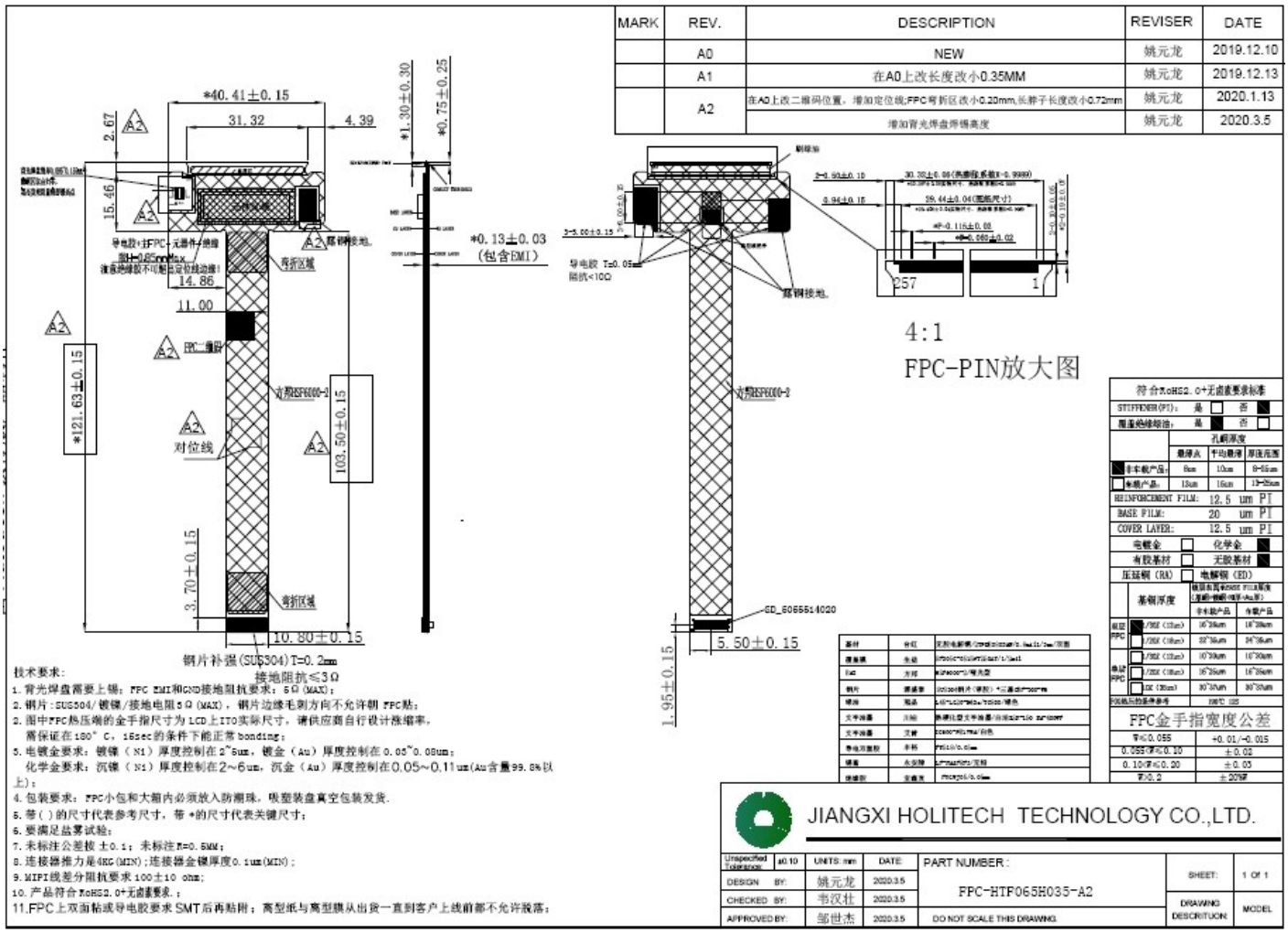
5.4 FPCA Outline Dimension



技术要求：
1. 背光焊盘需要上锡；FPC EMI和GND接地阻抗要求：5Ω（MAX）；
2. 钢片：SUS304/镀镍/接地电阻5Ω（MAX），钢片边缘毛刺方向不允许朝 FPC贴；
3. 图中FPC热压端的金手指尺寸为 LCD上ITO实际尺寸，请供应商自行设计拖缩率，需保证在 150° C，15sec的条件下能正常 bonding；
4. 电镀金要求：镀镍（Ni）厚度控制在 2~5um，镀金（Au）厚度控制在 0.05~0.08um；
   化学金要求：沉镍（Ni）厚度控制在2~6um，沉金（Au）厚度控制在0.05~0.11um(Au含量99.8%以上)；
4. 包装要求：FPC小包和大箱内必须放入防潮珠，吸塑装盘真空包装发货.
5. 带（）的尺寸代表参考尺寸，带 *的尺寸代表关键尺寸；
6. 要满足盐雾试验；
7. 未标注公差按 ±0.1；未标注R=0.5MM；
8. 连接器推力是4KG(MIN)；连接器金镀厚度0.1um(MIN)；
9. MIPI线差分阻抗要求 100±10 ohm;
10. 产品符合RoHS2.0+无卤素要求.；
11.FPC上双面粘或导电胶要求 SMT后再贴附；离型纸与离型膜从出货一直到客户上线前都不允许脱落；

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6. RELIABLITY TEST

Test Items	Conditions
1. HTO	Temperature 70℃ Sample Status operation Test time 240hr Room Temperature 2hr Measurement Point AA center point Judge Appearance and performance should be OK(No crackle, color change, bubble etc) check electrical, visual, optical, touch
2. LTO	Temperature -20℃ Sample Status operation Test time 240hr Room Temperature 2hr Measurement Point AA center point Judge Appearance and performance should be OK(No crackle, color change, bubble etc) check electrical, visual, optical, touch
3. HTS	Temperature 80℃ Test time 240hr Room Temperature 2hr Measurement Point AA center point Judge Appearance and performance should be OK(No crackle, color change, bubble etc) check electrical, visual, optical, touch
4. LTS	Temperature -40℃ Test time 240hr Room Temperature 2hr Measurement Point AA center point Judge Appearance and performance should be OK(No crackle, color change, bubble etc) check electrical, visual, optical, touch
5. HTBO	Temperature 60℃ Humidity 90% Sample Status operation Test time 240hr Room Temperature 2hr Measurement Point AA center point Judge Appearance and performance should be OK(No crackle, color change, bubble etc) check electrical, visual, optical, touch
6. TST	Temperature -40℃~80℃ Test time 30cycle = 60hr Room Temperature 2hr Measurement Point AA center point Judge Appearance and performance should be OK(No crackle, color change, bubble etc) check electrical, visual, optical, touch
7. Cold Bubble	Temperature -20℃/-30℃ Sample Status operation Test time 48hr/1hr Weight of iron ball 5.4g Diameter of iron ball φ11 Distance of drop 10cm Measurement Point AA center point Method First test: after storage 48hr at -20℃ ,ball drop 5 times the same place in room temperature. Second test: after storage 1hr at -30℃ ,ball drop 5 times the same place in room temperature. Judge No bubble

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8. Touch Salt Spray

Method □ 3 cycles, each cycle including two stages □
1).2 hours salt mist test □□ 15~35℃ □ , □ 5±1 □□ Nacl
2).22 hours store □□ 40±2℃ □ ,90% □ 95 □ RH
After 3 cycles test, remain in normal temp and humidity □ record touch performance results after 2 hours and 24 hours separately
Note: FPC connector and IC should be protect in the test."
Judge □ Appearance and performance should be OK(No crackle, color change, bubble etc)

9.Touch UV Aging

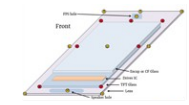
Method □ 8 UVA340 lamps □ 50±3mm between lamp and sample center. put the sample face light source
8 cycles, each cycle including 2 stages □
1.Expose in dark light,60±3℃ environment for 8 hours.
2.Store in dark light,60±3℃ environment for 4 hours □ spray water mist for 5 seconds □ Inspect if there is any abnormal change on the appearance
Judge □ Appearance and performance should be OK(No crackle, color change, bubble etc)

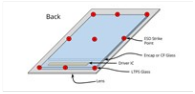
10.ESD

Test item □

Strike Location	Display status	RC network	Limit		Number of Strikes
			Contact	Air	
Front on display	Display On	330Ω/150pF	±4 kV	±8 kV	5 per location
Ground on metal plane	Display On	330Ω/150pF	±4 kV	±8 kV	5 per location
Front, Back Reset, Power, Ground on display flex	Display Off	1.5kΩ/100pF	±2.5 kV	n/a	5 per location
Front on touch	Display On	330Ω/150pF	±8 kV	±15 kV	10 per location
Reset, Power, Ground on touch flex	Display Off	330Ω/150pF	±2 kV	n/a	5 per location

Test position □



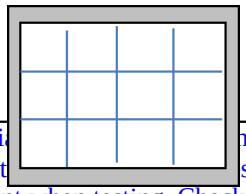


11.FPC_Peel

speed = 1 to 2 [illegible] 90degree □ Left □ Middle □ Right

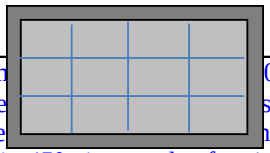
12.Yellow Spot Test

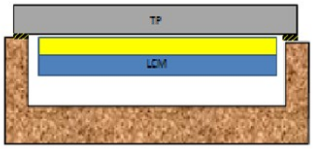
5mm/min □ 10mm diameter of spherical indenter □ 12 test points
As is shown in figure, put the LCD & Lens assembling unit on Jig and backlight up. Check LCM display in white pattern with a mirror. It's not allowed yellow spot at any point of 12 test points under 400gf. The amount of liquid crystal of samples must be typ or USL in order to ensure the reliability of test. Each type of samples is 3 pieces.



13.Water Ripple Test

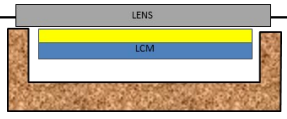
40mm mm di herical rubber □ 12 test points
As is divided int s each area with 10mm diameter of indenter. Record the level of water ripple each point when testing. Check in 100 gray pattern.

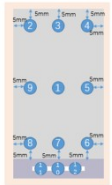




14.Ball Drop

10cm 0g weig its □
Unde steel bal 10cm high, and 3 poin of driver IC, if there ould ad .No abnormal is allowed(no white spot within 45° view angle after 1min).





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7. Safety & Environment Test Reports

Subject	Verification Test Result	Rev.	
		Stage	
		Date	
	Contents	Judgment	Notes
Reliability	1. HTO	PASS	
	2. LTO	PASS	
	3. HTS	PASS	
	4. LTS	PASS	
	5. HTBO	PASS	
	6. TST	PASS	
	7.ALT	PASS	
	8. Cold Bubble	PASS	
	9. Touch Salt Spray	PASS	
	10.Touch UV Aging		
	11. Touch Ink Adhesive(OGS Only)		
	12.UVPP Film adhesion		
Conclusion			

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8. Package

8.1. Packing Description

(1) Packaging structure table

Material Science	Specifications	Consumption
Outer box	550*400*260/double pit K paper	1pcs
Inner box	380*265*100mm/single pit K paper	4pcs
Vacuum bag	500*460*0.07 mm/silver/antistatic	4pcs
Antistatic label	Label/15*15*0.05/Silver Dragon Material/Antistatic	4pcs
Foam board	530*380*20mm/white	2pcs
Pearl cotton	310*210*0.5mm/red/antistatic	40pcs
Plastic suction tray	PET Antistatic/Company Purchase	44pcs
Modular	3PCS*40 plates per plate	120pcs

(2) Package method

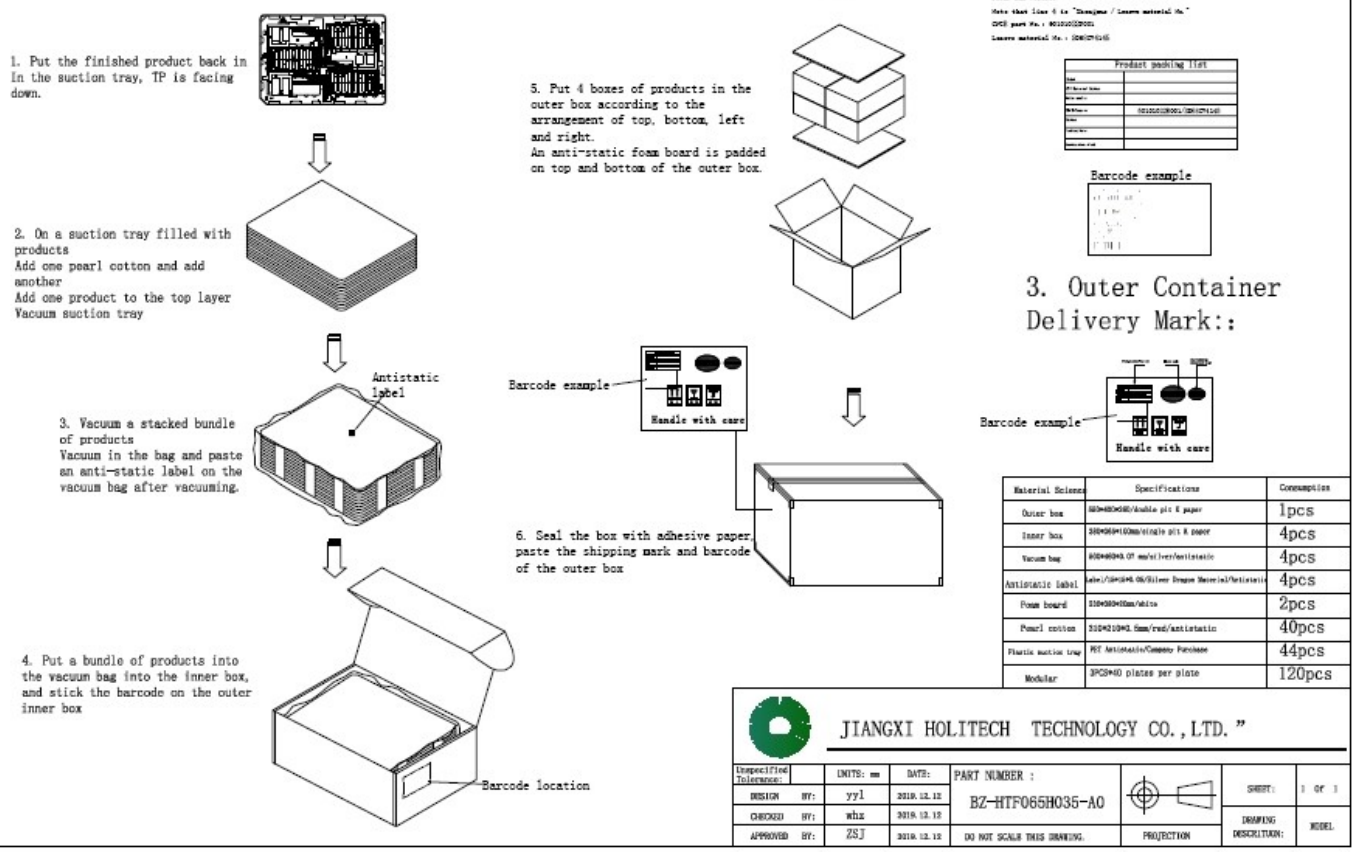
All Pages Of This Edition Approved

Signature: Date:

MARK	REV.	DESCRIPTION	REVISER	DATE
	A0	NEW!	yyl	2019.12.12

Compliance with RoHs 2.0 Standard

1. Packing pattern:



Material Science	Specifications	Consumption
Outer box	550*400*260/double pit K paper	1pcs
Inner box	380*265*100mm/single pit K paper	4pcs
Vacuum bag	500*460*0.07 mm/silver/antistatic	4pcs
Antistatic label	Label/15*15*0.05/Silver Dragon Material/Antistatic	4pcs
Foam board	530*380*20mm/white	2pcs
Pearl cotton	310*210*0.5mm/red/antistatic	40pcs
Plastic suction tray	PET Antistatic/Company Purchase	44pcs
Modular	3PCS*40 plates per plate	120pcs

JIANGXI HOLITECH TECHNOLOGY CO.,LTD.”

Unspecified Tolerance:		UNITS: mm	DATE:	PART NUMBER :		SHEET:	1 OF 1
DESIGN	BY:	yyl	2019.12.12	BZ-HTF065H035-A0			
CHECKED	BY:	whx	2019.12.12			DRAWING DESCRIPTION:	MODEL
APPROVED	BY:	ZSJ	2019.12.12	DO NOT SCALE THIS DRAWING.	PROJECTION		

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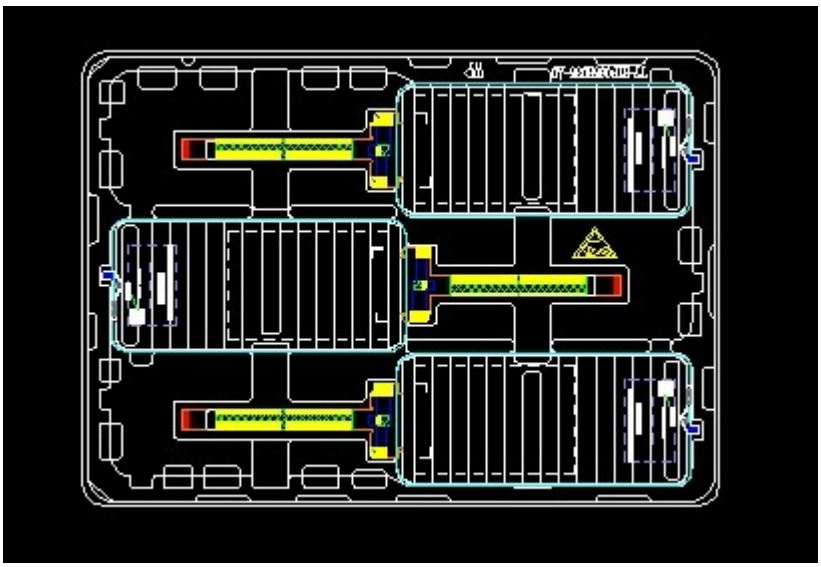
(3) Tray diagram



8.2. Label Code

(1) Carton Label

Product packing list	
Model	
HLT Material Number	
Order number	
CNCE/Lenovo	60101022R001/SD68C74145
Number	
Packing Date	
Examination clerk	

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(3) Wistron Product Label

Coding rule:

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Signature: Date:

REV.	DESCRIPTION	REVISER	DATE
A0	NEW	姚元龙	2019.12.12

HTF065H035二维码编码原则(53位)

8S Label 8S标签	Part Number 零件编号	Version 版本	Supplier Code 供应商代码	Supplier Site 供应商现场	Date Code 生产日期	Lot Code 批量代码	S/N 流水号
2位	12位	3位	7位	3位	4位	15位	7位
8S	%SD68C74145%	贴合图纸版本 (例A0版)—A0	4037064	我司是TFT2工厂生产 —2	生产当天日期 例2019.2.20 192L	———HTF065H035	例51025 —51025

8S%SD68C74145%贴合图纸版本4037064—2生产日期———HTF065H035流水号

带安全码:SD68C74145

月份:10—A 11—B 12—C

日期对照表

01 - 1	11 - B	21 - M
02 - 2	12 - C	22 - N
03 - 3	13 - D	23 - P
04 - 4	14 - E	24 - R
05 - 5	15 - F	25 - S
06 - 6	16 - G	26 - T
07 - 7	17 - H	27 - V
08 - 8	18 - J	28 - W
09 - 9	19 - K	29 - X
10 - A	20 - L	30 - Y
31 - Z		

流水号说明:

1、共7位，达不到7位时在数字前加“-”到7位，如1，对应就是———1，如100，对应就是——100。

2、流水号是独一无二的，不可重复，如首次生产100PCS，流水号是1到100，第二次生产也是100PCS，流水号是101到200。

3、当位数超过7位，达到10000000，最前1位用字母表示，流水号为A000000,详见流水号对照表。

超过7位流水号对照表

10 - A	11 - B
12 - C	21 - M
13 - D	22 - N
14 - E	23 - P
15 - F	24 - R
16 - G	25 - S
17 - H	26 - T
18 - J	27 - V
19 - K	28 - W
20 - L	29 - X
31 - Z	30 - Y

JIANGXI HOLITECH TECHNOLOGY CO., LTD.

DESIGN BY:	姚元龙	2019.12.12	PART NUMBER : HTF065H035二维码	DRAW NUMBER :
CHECKED BY:	毛汉壮	2019.12.12		
APPROVED BY:	邹世杰	2019.12.12	Unspecified Tolerance: ±0.20	UNITS: mm

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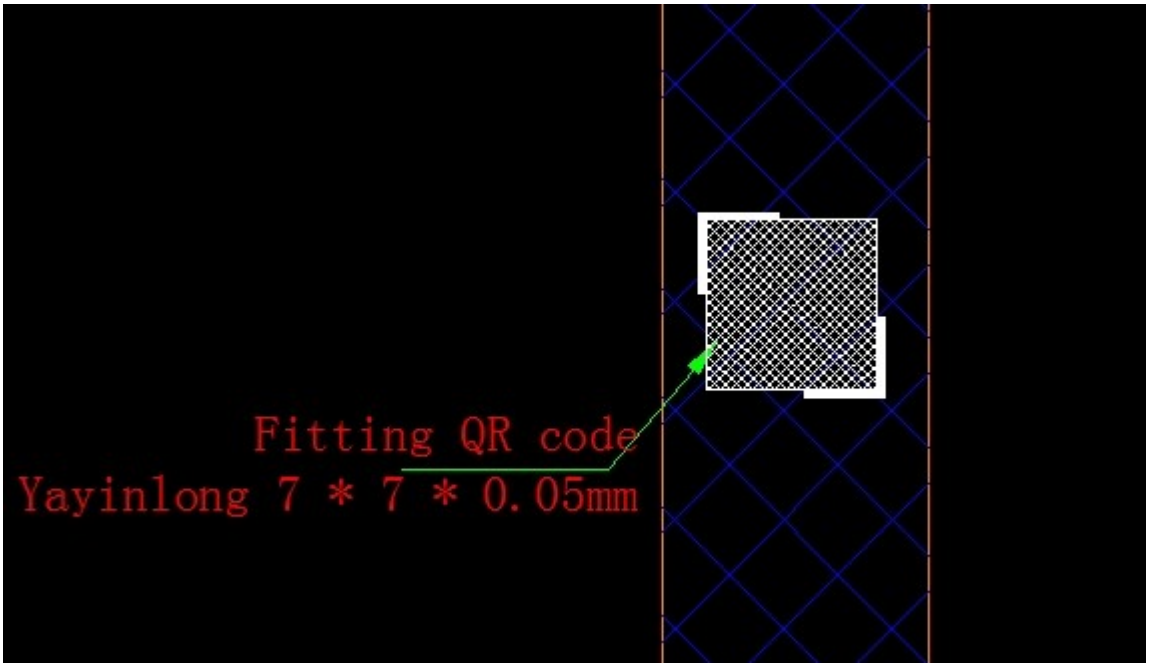
Size □ 7x7mm, Attached Location:



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9. Incoming Inspection Standard

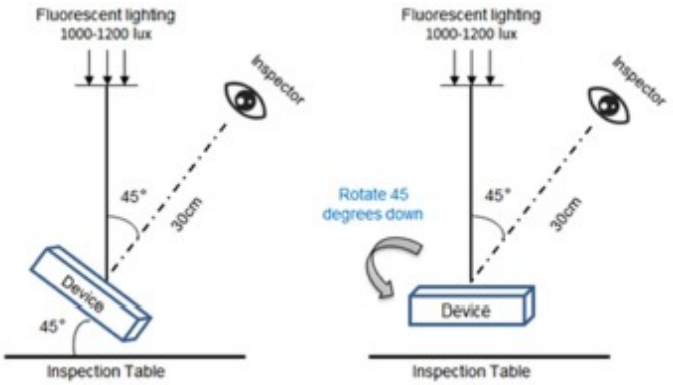
1.Inspection condition □ Electrical Inspection □

A. Inspection Illumination □ 200±50LUX

B. Light source: Cool white fluorescent □ 4230K □ ; distance from light source to the surface of parts not more than 100cm

C. Viewing Distance □ 30cm

D. Viewing angle □ the inspected surface of device should be put in 45° to table, the initial inspection angle is 90° or perpendicular to the surface, rotated around 45° to inspect all surfaces



2. Electrical Inspection Item □□ W--Defect Width □ L--Defect Length □ DS--Defect Distance □ N--Defect Number □ D--diameter □

Inspection Item	Inspection Criterion	Number	Distance
Scratches	W≤0.03mm	Ignore	
	0.03mm<W≤0.05mm □ L≤2.0mm	N≤2	DS≥10mm
	0.03mm □ W≤0.05mm □ L≤3mm	N≤1	
	No deep scratches that can be felt by finger		
Pinholes, Dots, Surface Particles	D≤0.1mm	Ignore	DS≥1mm
	0.1mm □ D≤0.15mm	N≤2	DS≥10mm
	0.15mm<D≤0.20mm	N≤1	
Linear shape, Fiber	Display area □ W≤0.05mm □ L≤0.8mm	N≤1	
Bright dot	R, G or B 1 dot	N≤1	
	Adjacent 2 dots	N≤1(Vertical not allow)	
	Adjacent 3 dots	N≤0	
	Minimum distance	DS≥10mm	
	Density	N≤0	
	Total Qty	N≤2	
Dark dot	1 dot	N≤2	
	Adjacent 2 dots	N≤1(Vertical not allow)	
	Adjacent 3 dots	N≤0	
	Minimum distance	DS≥10mm	
	Density	N≤0	
	Total Qty	N≤3	
Tiny Dot/Particle Bright Dot	Folloe the limit sample		
Light Leakage	Not Allowed		
Luminance □ Color difference	Follow spec		
Display abnormal	Not Allowed		
Image sticking	Not Allowed		
fuzzy display	Not Allowed		
Screen flash	Not Allowed		

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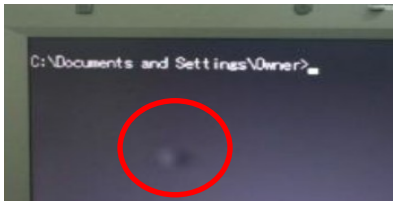
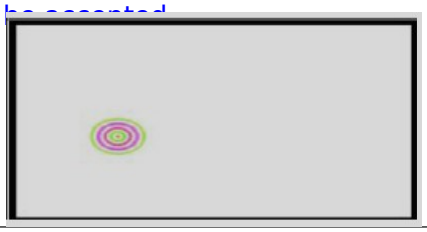
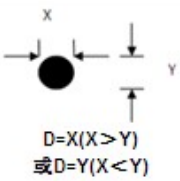
Inspection Item	Inspection Criterion
Mura	Follow the ND Filter or the limit sample
water ripple	With the contact pen pressure display area, there shall be no water ripple 
Newton Ring	Under the condition of high temperature and high humidity, under the white pattern due to heating effect of the different layers in the LCD module lead to differ deformation. This phenomenon can be recover under normal environment. Fixed position ring cannot be accepted, the not fixed position for 3 seconds to disappear can be accepted 

Note □

Mura	gap or uneven pressure in CF, TFT, LCD and LCM process. Mura could be vertical, horizontal, diagonal or patterned.
Bright dot	A dot is defined as a single sub-pixel (either red, green, or blue) within a pixel The definition of Bright pixels or dots: Pixel or dots that can be seen through the bare eyes of an operator under ambient light of 0 lux to 200±50 lux Bright dots shall be counted on a Black raster
Dark dot	A dot is defined as a single sub-pixel (either red, green, or blue) within a pixel Dark dots that can be seen with bare eyes, dark dots shall be counted on a 100% White raster, under ambient light of 0 lux to 200±50 lux
Dot clustering	There are many dots in the smaller area, refer to limit sample

缺陷定义			
	线状缺陷	点状缺陷	崩边，崩角，凸边

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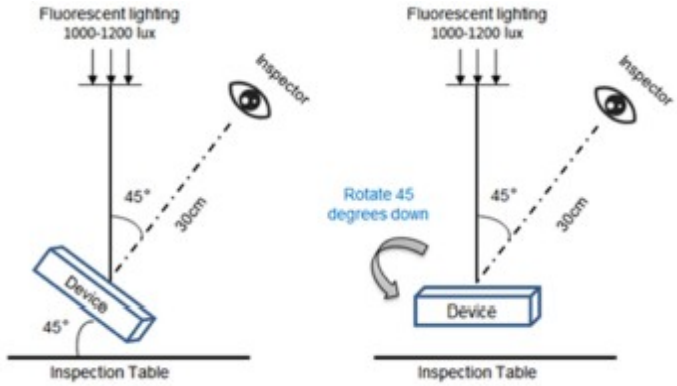
1.Inspection condition(visual inspection):
A.Inspection Illumination: 1000~1200lux;
B.Viewing Distance: 30cm
C.Viewing angle: the inspected surface of device should be put in 45° to table, the initial inspection angle is 90° or perpendicular to the surface, rotated around 45° to inspect all surfaces
D. B. Light source: Cool white fluorescent □ 4230K □ ; distance from light source to the surface of parts not more than 100cm



2.Area definition:

AA Area	Information display area only (Display window area, including the big screen window, small screen window and camera lens area (not including the camera deco, inactive area or border of the display))
A Area	Front visible area. Primary surface exposed to direct closeup view in ordinary use. (Examples: positive viewable surface)

Area	Inspection Item	Inspection Criterion	Number	Distance
AA Area	Scratches	W≤0.03mm	Ignore	
		0.03mm □ W≤0.05mm □ L≤2mm	N≤2	DS≥10mm
		0.03mm □ W≤0.05mm □ L≤3mm	N≤1	
		No deep scratches that can be felt by finger		
	Pinholes, Dots, Surface Particles	D≤0.1mm	Ignore	DS≥1mm
		0.1mm □ D≤0.15mm	N≤2	DS≥10mm
		0.15mm<D≤0.20mm	N≤1	
	Linear shape, Fiber	Display area: W≤0.05mm □ L≤0.8mm Decorative area: W≤0.05mm, L≤1.0mm	N≤1	
	Screen Printing, Pad Printing, Laser Etching	Misalignment: From center point of artwork≤0.2mm		
		Missing or excess paint: D≤0.2mm □ DS □ 10mm	N≤2	
		Ghosting/Double print: Not Allowed		
		Missing Characters: Not Allowed		
		Formation: Images are to be clean, crisp and smooth		
	AF coating	Use oily pen drawing 3 cm line on the front, continuous for NG, discontinuous is OK		
	Other Item	Dirt □ Water/Oil marks □ Cracking □ Chipping □ Peeling □ Blistering □ Inclusions □ Bubbles □ Grid lines: Not Allowed		

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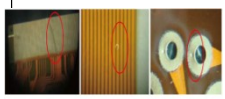
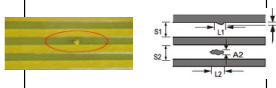
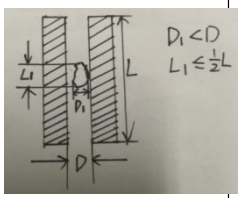
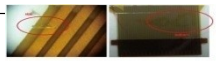
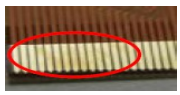
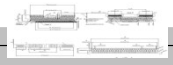
Area	Inspection Item	Inspection Criterion	Number	Distance
A Area	Scratches	W≤0.03mm	Ignore	
		0.03mm □ W≤0.05mm □ L≤2mm	N≤2	DS≥10mm
		0.03mm □ W≤0.05mm □ L≤3mm	N≤1	
		No deep scratches that can be felt by finger		
	Linear shape, Fiber	W≤0.05mm □ L≤1.5mm	N≤2	DS≥10mm
	Pinholes, Dots, Surface Particles	Same Color Defect: 0.1mm □ D≤0.2mm	N≤2	DS≥10mm
		Same Color Defect: 0.2mm □ D≤0.25mm	N≤1	
		Contrast Color Defect: 0.1mm □ D≤0.15mm	N≤2	DS≥10mm
		Contrast Color Defect: 0.15mm □ D≤0.2mm	N≤1	
		D □ 0.1mm	Ignore	
	Color	Refer to Limit Samples if applicable		
		Color must be consistent and even throughout the part		
	Stain	Not Allowed		
	Screen Printing, Pad Printing, Laser Etching	Misalignment: From center point of artwork ≤0.2mm		
		Missing or excess ink: D≤0.2mm □ DS □ 10mm	N≤2	
		Ghosting: Not Allowed		
		Missing: Not Allowed		
		Double print: Not Allowed		
		Formation: Images are to b crisp and smooth		
	Cover Glass edge chipping	D≤0.15mm, H≤T/2	N≤1	
	CG outside edge Light Leakage	W<0.1mm	N :Ignore	DS ≥ 10mm
		0.1mm ≤ W ≤ 0.2mm,L≤5mm	N ≤ 2	DS≥10mm
		Out of the above range	Not Allowed	
	CG inner edge Light Leakage	Not Allowed or judge by limit sample		
	Ink Pinhole	D≤0.10mm	N≦4	DS≧15mm
		D>0.1mm, or affect the appearance	Not Allowed	
		The defect inspection using reflected light, the black background check is not visible to ignore		
	AF coating	Use oily pen drawing 3 cm line on the front, continuous for NG, discontinuous is OK		
	Screen printing color difference	From the front visual no difference		
	convex edge	Not Allowed		
	Crack	Not Allowed		
	Logo	Appearance refer to limit sample		
	Photosensitive gole	Circular Defect D≤0.1mm Allow one □ but clustering points are not allowed □ Circular Defect D □ 0.1mm Not Allowed □ Other Defect is not allowed This part defects in black examine environment background to execution		
	Camera Hole	Circular Defect D≤0.1mm Allow one □ but clustering points are not allowed □ Circular Defect D □ 0.1mm Not Allowed □ Other Defect is not allowed		
	Light hole	Circular Defect D≤0.1mm Allow one □ but clustering points are not allowed □ Circular Defect D □ 0.1mm Not Allowed □ Other Defect is not allowed		
	Other Item	Dirt □ Water/Oil marks □ Cracking □ Chipping □ Peeling □ Blistering: Not Allowed		
Back Area	Bubble	Ignore □ But don't allow to extend to AA		
	Ink Pimple	Circular Defect □ D≤3mm, Height H≤0.1mm	Ignore	
		Linear Defect □ L≤5mm, Height H≤0.1mm		
	CG Ink Surface energy (dyne value)	Use German factory 32 dyne pen draw a 1 cm line on the test surface, let stand for 30 seconds, observation line trace not retracted is OK		
	Stain	Ignore		
	Dirt can't be			

Area	Inspection Item	Inspection Criterion		Image
FPC Area	Folding/pressure/ needle marks	1. Whether the FPC board face form acute Angle (dead), indentation is through the FPC bulge on the back of the back (whether white), conductor needle is less than 0.1 mm 2. Test whether the needle leakage nickel, copper 3. If there is a folding indentation coating area	Not Allowed	
	Conductor scratch	Without protective film covering parts is the leakage of copper and nickel	Not Allowed	
	flatness	Make up parts area part, inspection FPC Bonding area of ontology and steel reinforcement is a warp	Bonding Area Arch warp≤2mm □ undulating warp≤1.5mm Steel reinforcement area warp≤1mm	
	residual copper	The conductor on the FPC line, because of the process or other factors produce the conductor residue in the conductor spacing, residual conductor scope of general line insulation degree decline, produce insulation fault phenomenon.	L1 ≤ 2 S 1 , A1 ≤ 1 / 2 S 1 L2 ≤ 2 S 2 , A2 ≤ 1 / 2 S 2	
	foreign matter	If there is a foreign matter	Bonding Area □ Foreign body with gold finger surface Gold finger between foreign card specifications D1<D & L1≤½L No Bonding Area □ Electrical conductivity foreign bodies by the residual copper standard Of non-conductive foreign bodies across the third line, is not acceptable The electrical conductivity foreign body massive foreign body≦1mm→OK The electrical conductivity foreign matter filamentous foreign matter≦2mm→OK	
	Glue/surface dirt	Whether there is residual glue/conductor surface dirt	Not Allowed	
	Air bubbles	(1) whether the protective film of bubble across the two wires (2) whether the edge of bubbles	Not Allowed	
	Lack of ink	Whether the conductor naked	Not Allowed	
	Printed word	1. Whether writing visual identification 2. The word out Text is offset to the PAD printing 3. Whether or not bearing the text	Not Allowed	 
	Plating color / oxidation	1. Tin lead change color: tin lead the sunburned or green 2. Gold-plated color: whether apparently gold-plated erythema, fingerprint	Not Allowed	 
	Parts missing / Over parts	Whether the lack of or more	Not Allowed	
	The key size	Key size measurement	Must be within dimensional tolerance	

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10. Checklist

	Description	Request	Value
Connection	MIPI Impedance	100±10Ω	Yes
	B2B CNT	FR4, 0.3mm	SUS304, 0.2mm
	ID Pin	1st source: GND 2nd source: 1.8V(different cell) 2nd source: GND(same cell+IC)	A1:0x0f , 0x04 ,0x02 ,0x91 DAH:0x00,DBH:0x00, DCH:0x13
IC	Protection	Shielding tape on IC	NO
FPC	Bending Area	Not exceed M/F	YES
	FPC status	Unfolded while direct bonding	YES
	GND Area	Need GND area to connect SUS	YES
	Test Points	Need shieling tape on it	YES
	Bending Area	Single layer	Single layer
SUS	4 Corner side	At lease 1.2mm	Yes
Panel	Glass Generation	G5?G6?	G6
	Cutting Q'ty	panel Q'ty each mother glass	-
	Display mode	VA/IPS	ADS
	Mask Q'ty	Array mask	7
	Pixel Domain	1 or 2?	1 Pixel 1 Domain
	ITO@C/F	ITO square resistance, thickness	≤ 5kΩ/□ ,≤ 200Å
	Scan direction	Single scan or dual scan	dual scan
	PS Parameter	Main/Sub PS density and size	MPS=9um Density=0.072% SPS=9.5um Density=2.24%
	Cell gap	Center point	3.2±0.2 um
	LC injection	Vacuum injection or ODF	ODF
	LC Margin	>6%	> 5%
	Pol compensation	A+C/B+B/None compensation film	None compensation film
	UV Glue	Fill out at IC around	Silicon Glue
	Pol surf. Treatment	Direct bonding: HC+Glare Air bonding: Haze44+glare(>4inch)	□□□□□
	Pol position	Direct bonding: pol is higher 0.05mm than M/F Air bonding: pol is lower 0.05mm than M/F	Yes
Package	Surface resistance	10^4~10^9Ω	10^9~10^11Ω
	Friction voltage	≦100V	≦100V
	Layer in one Box	<10layer	10Tray

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