

SPECIFICATIONS

CUSTOMER	:	CNO003
SAMPLE CODE	:	SMA320240T028-ZHC
MASS PRODUCTION CODE	:	HMA320240T028-ZHC
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	002
DRAWING NO. (Ver.)	:	LMD- HMA320240T028-ZHC(Ver.002)
PACKAGING NO. (Ver.)	:	PKG- HMA320240T028-ZHC(Ver.001)

Customer Approved

Date:

Approved	Checked	Designer
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- ☐ Preliminary specification for design input
☒ Specification for sample approval



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History of Version

[illegible]

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1. SPECIFICATIONS

1.1 Features

Hardware

CPU	RISC Processor	STM32H750 480 MHz, ARM Cortex-M7
Memory	RAM	16MB SDRAM
	Flash	32MB QSPI FLASH 8GB eMMC
	External Storage	1 x Micro SD (max. 32G)
Display	Resolution	320 x 240
	Touch Panel	Projected Capacitive Touch
	Interface	Parallel RGB 24 bits
	Viewing Direction	Full Viewing Angle , Normally Black , Transmissive type
I/O	USB	1 x USB2.0 Device
	Serial	1 x UART, 1 x SPI, 1 x I2C, 1 x CAN
	RMII	1 x Ethernet
Power Input	DC	5V

Note:

1. Support Micro USB Power Supply.
2. Support USB Device Full Speed.
3. Support CAN Bus (Compatible with ISO11898-2).
4. Support Ethernet (10BASE-T / 100BASE-T).
5. Support RTC.

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	84.02(W) x 75.36(L) x 14.0(H) MAX	mm
Active Area	70.08(W) x 52.56(L)	mm

1.3 Absolute Maximum Ratings

Ta = 25°C

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply	VIN	—	4.5	6.0	V
Operating Temperature	T _{OP}	—	-20	70	°C
Storage Temperature	T _{ST}	—	-30	80	°C
Humidity	HD	Ta=60 °C	10	90	%RH

1.4 DC Electrical Characteristics

Ta = 25°C

Item	Sym bol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	VIN	-	4.5	5	5.5	V
Power Supply Voltage of RTC	VBAT	-	1.2	-	3.6	V
Power Supply Current	IIN	VIN = 5V	-	480	-	mA
Power Consumption of System	PIN	VIN = 5V	-	2.4	-	W
High-Level voltage of digital input	V _{IH}	-	2.3	-	-	V
Low-Level voltage of digital input	V _{IL}	-	-	-	0.9	V
High level voltage of digital output	V _{OH}	-	2.4	-	-	V
Low level voltage of digital output	V _{OL}	-	-	-	0.4	V

1.5 Optical Characteristics

TFT LCD Module

VDD = 3.3 V, Ta=25 °C

Item	Symbol		Condition	Min.	Typ.	Max.	unit	
Response time	Tr+Tf		Ta = 25 °C $\theta X, \theta Y = 0^\circ$	-	30	40	ms	Note 2
Viewing angle	Top	$\theta Y+$	CR ≥ 10	-	80	-	Deg.	Note 4
	Bottom	$\theta Y-$		-	80	-		
	Left	$\theta X-$		-	80	-		
	Right	$\theta X+$		-	80	-		
Contrast ratio		CR	Ta = 25 °C $\theta X, \theta Y = 0^\circ$	650	800	-	-	Note 3
Color of CIE Coordinate (With B/L & TP)	White	X		0.23	0.28	0.33		Note1
		Y		0.27	0.32	0.37		
	Red	X		0.58	0.63	0.68		
		Y		0.31	0.36	0.41		
	Green	X		0.29	0.34	0.39		
		Y		0.55	0.60	0.65		
	Blue	X		0.09	0.14	0.19		
		Y		0.04	0.09	0.14		
Average Brightness Pattern=white display (With TP) *1	IF		VCC=12.0V PWM="High" (Duty=100%)	650	800	-	cd/m ²	Note1
Uniformity (With TP) *2	ΔB		VCC=12.0V PWM="High" (Duty=100%)	70	-	-	%	Note1

Note 1:

*1 : $\Delta B = B(\min) / B(\max) * 100\%$

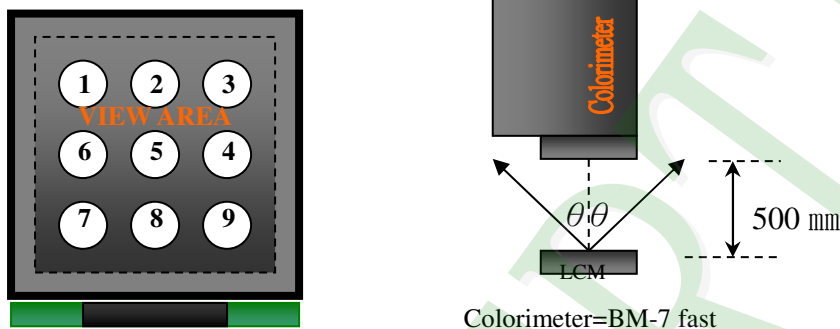
*2 : Measurement Condition for Optical Characteristics:

a : Environment: $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ / $60 \pm 20\%$ R.H , no wind , dark room below 10 Lux at typical lamp current and typical operating frequency.

b : Measurement Distance: 500 ± 50 mm , ($\theta = 0^{\circ}$)

c : Equipment: TOPCON BM-7 fast , (field 1°) , after 10 minutes operation.

d : The uncertainty of the C.I.E coordinate measurement ± 0.01 , Average Brightness $\pm 4\%$



To be measured at the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-7, after 10 minutes operation (module)

Note2: Definition of response time:

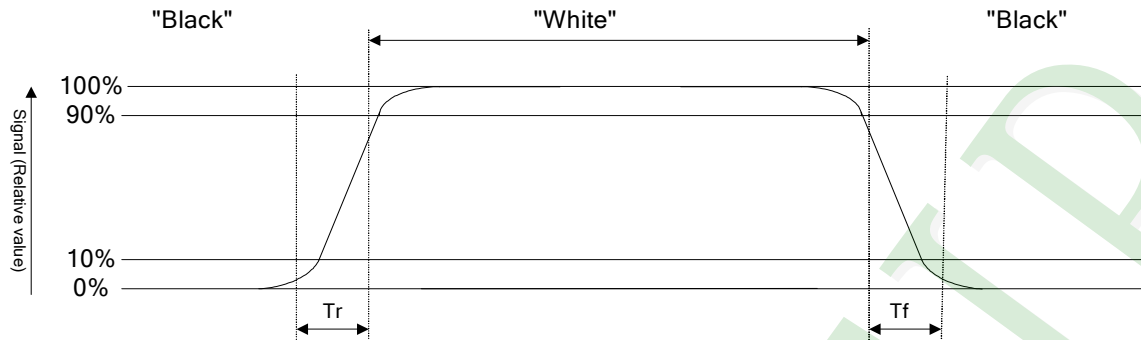
The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:

Normally White



Normally Black



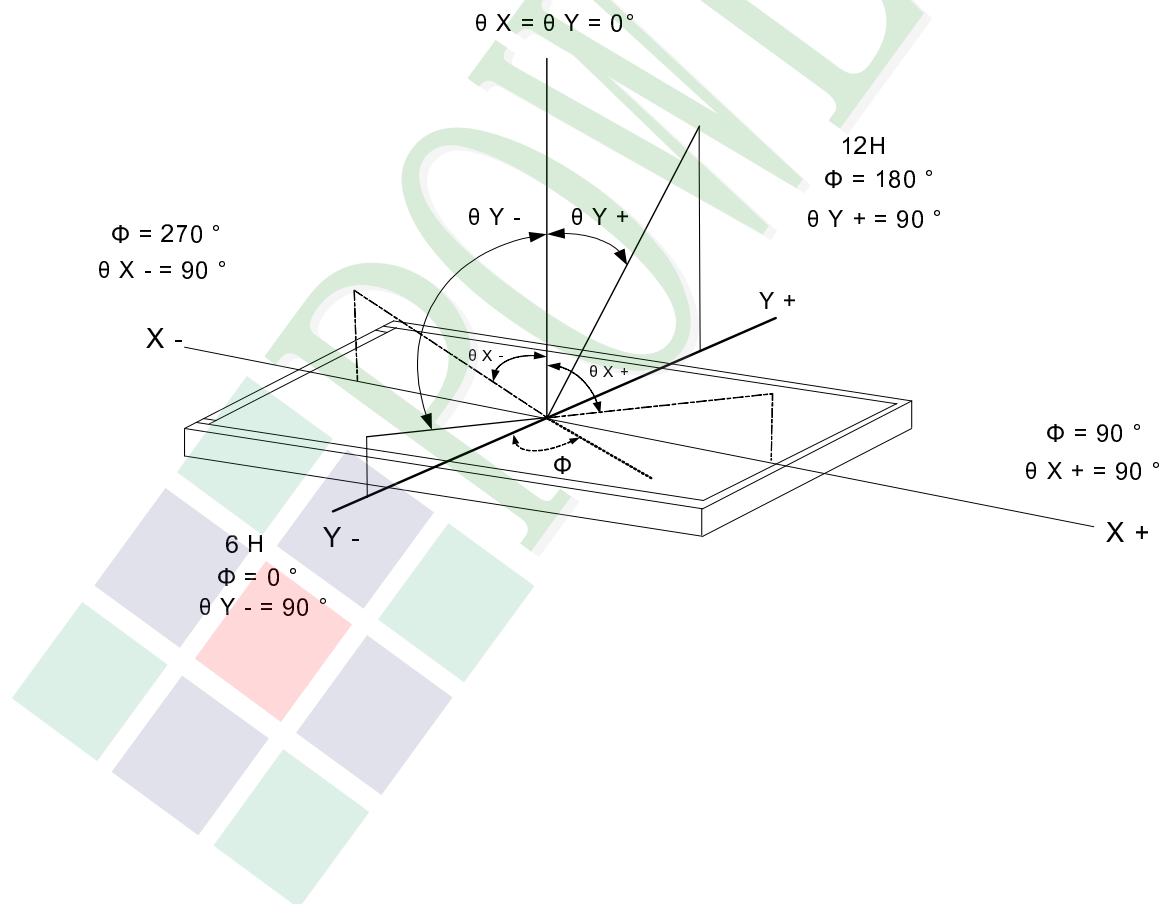
Note3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note4: Definition of viewing angle:

Refer to figure as below:



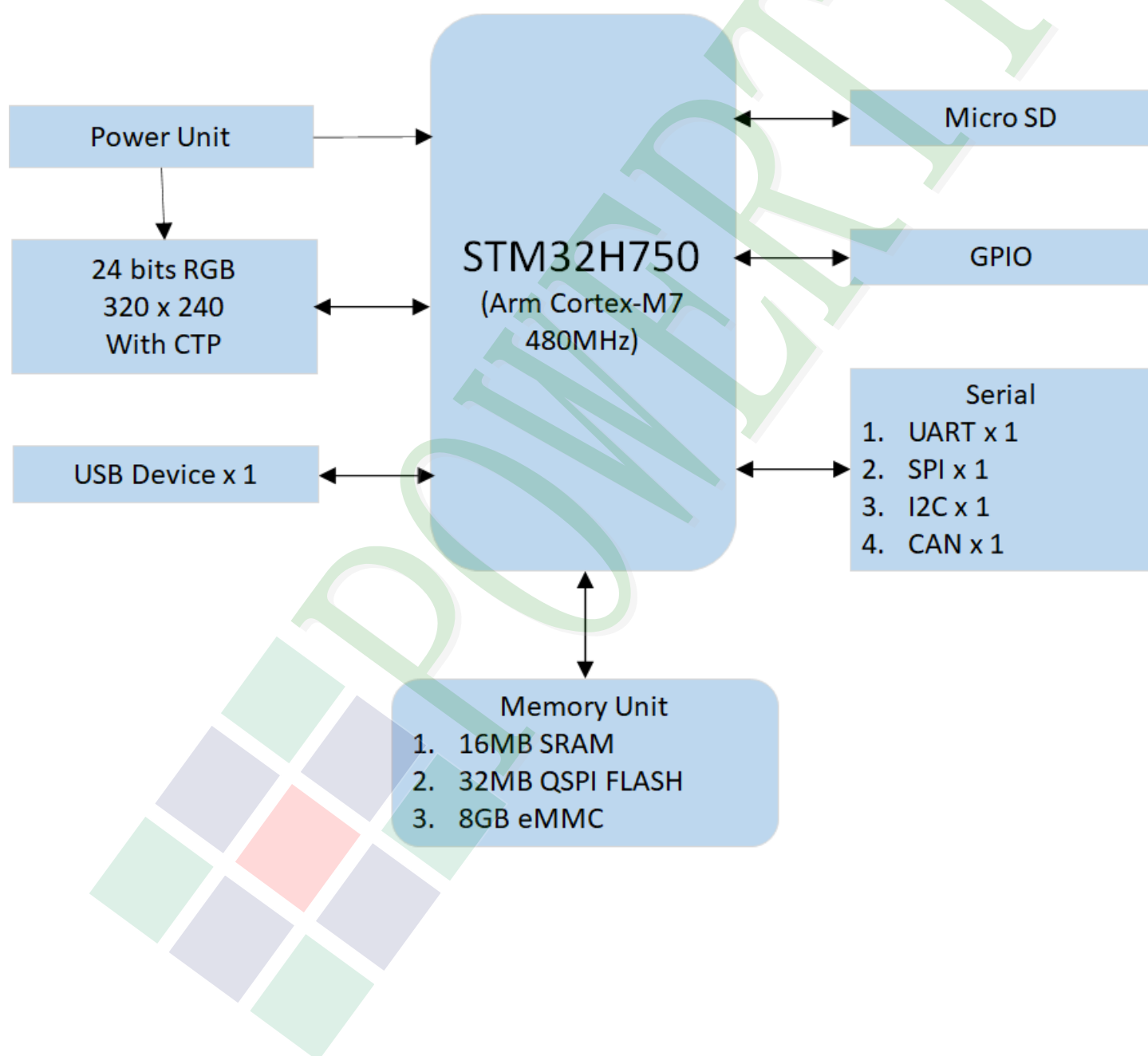
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 Mechanical Diagram

* See Appendix

2.1.2 Block Diagram



2.2 Interface Pin Description

JT1 --- JTAG (Wafer Pitch1.25mm 6pin)

Pin No.	Symbol	Type	DESCRIPTION
1	PA15	IO	General Purpose I/O, Port A [15].
2	PA8	IO	General Purpose I/O, Port A [8].
3	RESETINn	I	JTAG test reset.
4	JTMS/SWDIO	I/O	JTAG test mode select / Serial wire data in/out.
5	JTCK/SWCLK	I	JTAG test clock / Serial wire clock.
6	GND	P	Ground.

J3 --- CAN Bus (Wafer Pitch1.25mm 2pin)

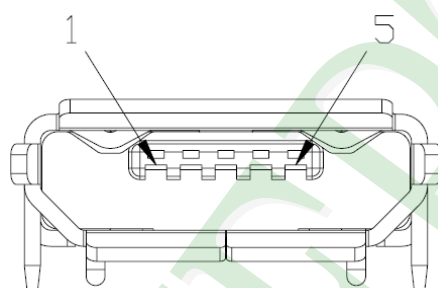
Pin No.	Symbol	Type	DESCRIPTION
1	CAN H	DS	High Level CAN Bus Line.
2	CAN L	DS	Low Level CAN Bus Line.

J8 --- RTC (Wafer Pitch1.25mm 2pin)

Pin No.	Symbol	Type	DESCRIPTION
1	VBAT	P	Power Supply for RTC.
2	GND	P	Ground.

J4 --- USB 2.0 Device MICRO USB

Pin No.	Symbol	Type	DESCRIPTION
1	VBUS5V	P	+5.0V
2	D-	DS	Data – (Data M)
3	D+	DS	Data + (Data P)
4	ID	-	Not Used.
5	GND	P	Ground



J6 --- Ethernet (Wafer Pitch1.25mm 10pin)

Pin No.	Symbol	Type	DESCRIPTION
1	GND	P	Ground.
2	GND	P	Ground.
3	LED_ACK	O	Link Speed LED Indication. (See Note 1)
4	RXD-	DS	Receive Negative.
5	RXD+	DS	Receive Positive.
6	TXD-	DS	Transmit Negative.
7	TXD+	DS	Transmit Positive.
8	LED_LINK	O	Link Activity LED Indication. (See Note 2)
9	GND	P	Ground.
10	VDD3V3	P	Power Supply (+3.3V).

Note 1: This pin is driven active when the operating speed is 100Mbps. It is inactive when the operating speed is 10Mbps or during line isolation.

Note 2: This pin is driven active when a valid link is detected and blinks when activity is detected.

J10 --- P05D00071-01 Interface Reserved (Pitch 0.5mm 30pin Double contact)

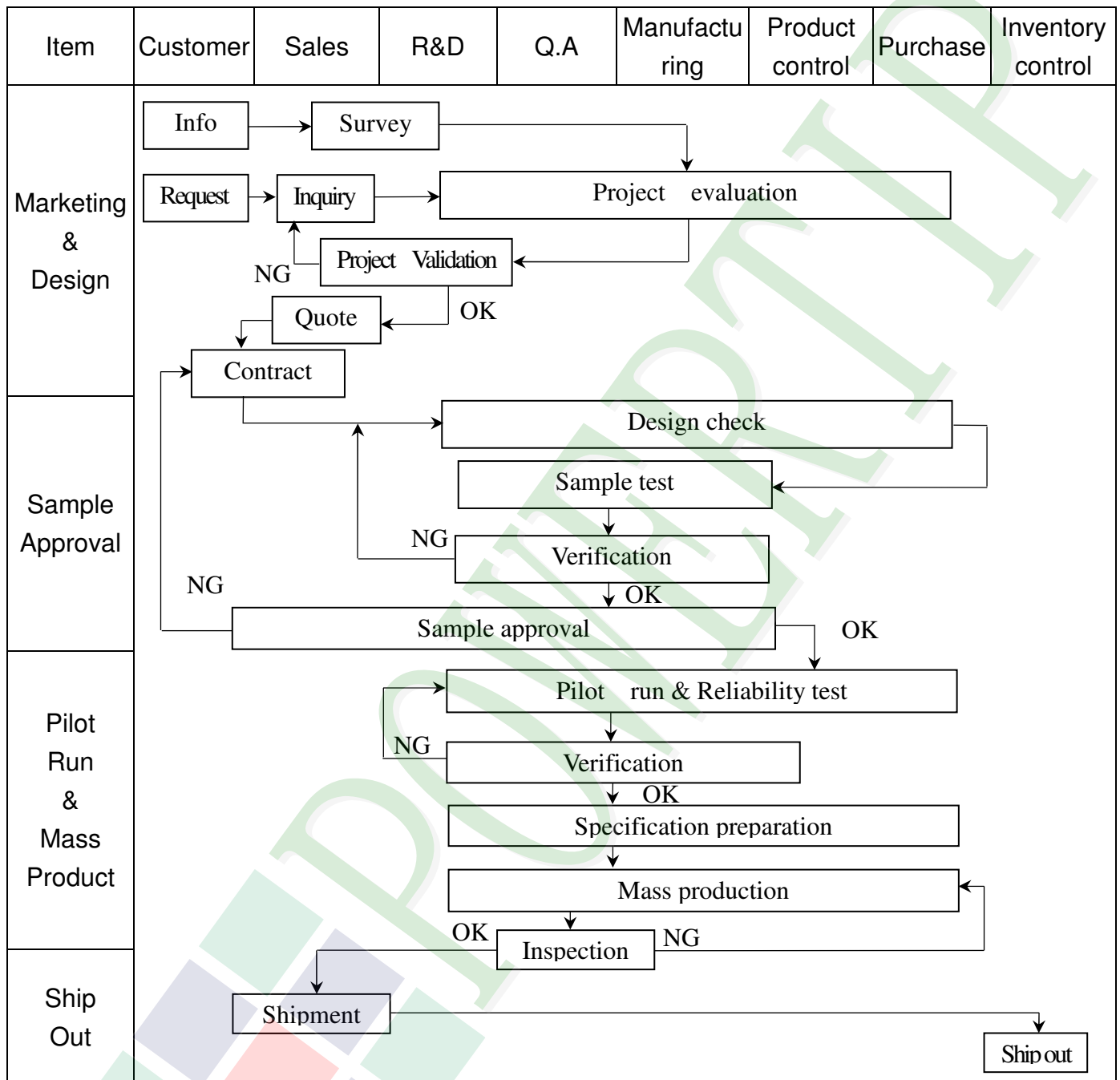
Pin No.	Symbol	Type	DESCRIPTION
1	GND	P	Ground.
2	PG3	IO	General Purpose I/O, Port G [3].
3	PB2	IO	General Purpose I/O, Port B [2].
4	NC	-	Not Used.
5	GND	P	Ground.
6	I2C_CLK	IO	I2C2 CLK.
7	GND	P	Ground.
8	I2C_DAT	IO	I2C2 DAT.
9	GND	P	Ground.
10	SPI_CLK	IO	SPI1 CLK.
11	GND	P	Ground.
12	SPI_MISO	IO	SPI1 MISO.
13	SPI_MOSI	IO	SPI1 MOSI.
14	GND	P	Ground.
15	SPI_CS0	IO	SPI1 CS0.
16	GND	P	Ground.
17	PH6	IO	General Purpose I/O, Port H [6].
18	PH7	IO	General Purpose I/O, Port H [7].
19	PH4	IO	General Purpose I/O, Port H [4].
20	PB1	IO	General Purpose I/O, Port B [1].
21	GND	P	Ground.
22	RESETINn	I	System Reset, Active Low.
23	UART_RXD	IO	USART2 RX.
24	UART_TXD	IO	USART2 TX.
25	GND	P	Ground.
26	VIN	P	Power Supply (+5.0V).
27	VIN	P	Power Supply (+5.0V).
28	UART_CTS	IO	USART2 CTS.
29	UART_RTS	IO	USART2 RTS.
30	GND	P	Ground.

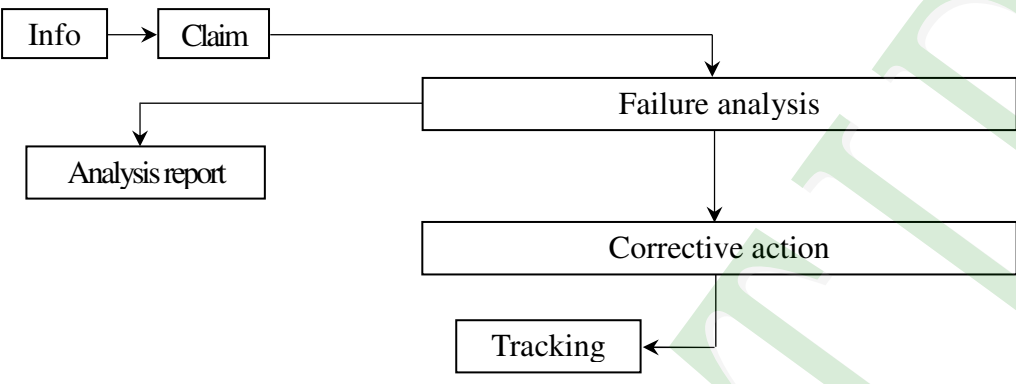
J13 --- Power Input (Wafer Pitch1.25mm 4pin)

Pin No.	Symbol	Type	DESCRIPTION
1	VBUS5V	P	+5.0V
2	VBUS5V	P	+5.0V
3	GND	P	Ground
4	GND	P	Ground

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart



Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	 <pre> graph TD Info[Info] --> Claim[Claim] Claim --> Failure[Failure analysis] Failure --> Report[Analysis report] Failure --> Action[Corrective action] Action --> Tracking[Tracking] </pre>							
Q.A Activity	1. ISO 9001 Maintenance Activities 3. Equipment calibration 5. Standardization Management				2. Process improvement proposal 4. Education And Training Activities			

4. RELIABILITY TEST

4.1 Reliability Test Condition

NO.	TEST ITEM	TEST CONDITION										
1	High Temperature Storage Test	Keep in +80 ±2℃ 96 hrs Surrounding temperature, then storage at normal condition 4hrs.										
2	Low Temperature Storage Test	Keep in -30 ±2℃ 96 hrs Surrounding temperature, then storage at normal condition 4hrs.										
3	High Temperature / High Humidity Storage Test	Keep in +60℃ / 90% R.H duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer)										
4	Temperature Cycling Storage Test	-30℃ → +25℃ → +80℃ → +25℃ (30mins) (5mins) (30mins) (5mins) ← 10 Cycle → Surrounding temperature, then storage at normal condition 4hrs.										
5	Vibration Test (Packaged)	1. Sine wave 10~55 Hz frequency (1 min) 2. The amplitude of vibration :1. 5 mm 3. Each direction (X 、 Y 、 Z) duration for 2 Hrs										
6	Drop Test (Packaged)	<table><tr><th>Packing Weight (Kg)</th><th>Drop Height (cm)</th></tr><tr><td>0 ~ 45.4</td><td>122</td></tr><tr><td>45.4 ~ 90.8</td><td>76</td></tr><tr><td>90.8 ~ 454</td><td>61</td></tr><tr><td>Over 454</td><td>46</td></tr></table> Drop direction :※1 corner / 3 edges / 6 sides each 1times	Packing Weight (Kg)	Drop Height (cm)	0 ~ 45.4	122	45.4 ~ 90.8	76	90.8 ~ 454	61	Over 454	46
Packing Weight (Kg)	Drop Height (cm)											
0 ~ 45.4	122											
45.4 ~ 90.8	76											
90.8 ~ 454	61											
Over 454	46											

5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

- 5.1.1 If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
- 5.1.2 If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

5.2 HANDLING

- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI – When working with the module, be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 The polarizing plate of the display is very fragile. So, please handle it very carefully, do not touch, push or rub the exposed polarizing with anything harder than an HB pencil lead (glass, tweezers, etc.)
- 5.2.5 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- 5.2.6 Do not touch the display area with bare hands, this will stain the display area.
- 5.2.7 Do not use ketonic solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.
- 5.2.8 To control temperature and time of soldering is $320 \pm 10^{\circ}\text{C}$ and 3 ~ 5 sec.
- 5.2.9 To avoid liquid (include organic solvent) stained on LCM.
- 5.2.10 Caution! (LCM products with Capacitive Touch Panel)
Strong EMI-sources such as switch-mode power supplies (SPS) can lead to touch malfunction (e.g., ghost-touches). Therefore, the touch needs to be thoroughly tested inside the target application.
- 5.2.11 CAUTION: Continuously displaying same static image will result in high possibility of image sticking/image burn-in effect due to TFT panel characteristic.
- 5.2.12 Double-sided tape designed to be attached with the customer's mechanical device, please follow up the rules and regulations published by the original manufacturer of double-side tape for the attachment operation.

5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
- 5.3.2 Do not place the module near organics solvents or corrosive gases.
- 5.3.3 Do not crush, shake, or jolt the module.

5.4 TERMS OF WARRANTY

- 5.4.1 Applicable warrant period
The period is within thirteen months since the date of shipping out under normal using and storage conditions.
- 5.4.2 Unaccepted responsibility
This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in nuclear power control equipment, aerospace equipment, fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.

Ver.001		LCM包裝規格書 LCM Packaging Specifications		Approve	Check	Contact
Documents NO.	PKG-HMA320240T028-ZHC			Marcus	Bright	Nini

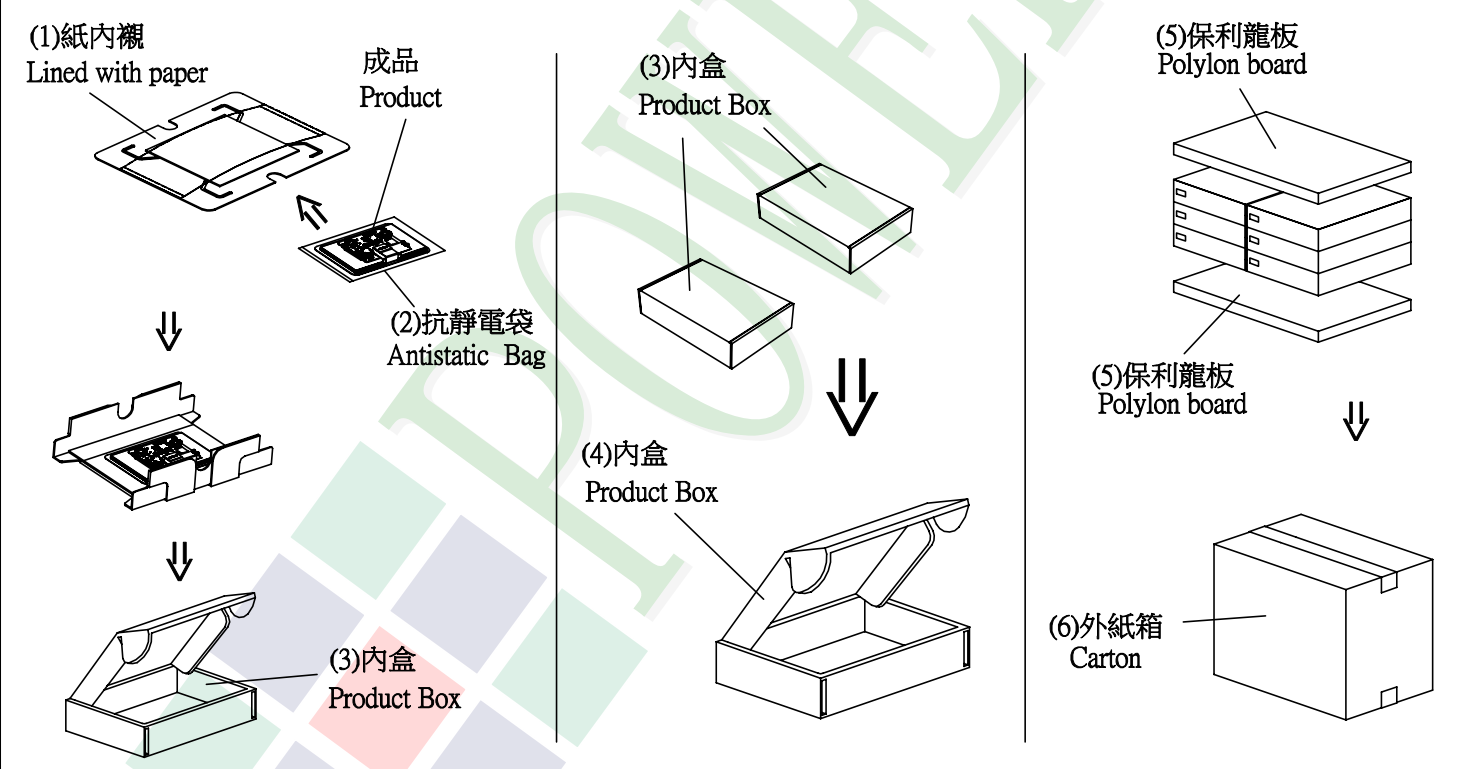
1.包裝材料規格表 (Packaging Material) : (per carton)

No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品 (Product)	HMA320240T028-ZHC	84.02 X 75.36	0.066	12	0.792
2	紙內襯 (1)Lined with paper	BX00000000132	347 X 262	0.07	12	0.84
3	抗靜電袋(2)Antistatic Bag	BAG150120ARABA	120 X 150	0.002	12	0.024
4	內盒(3)Product Box	BX00000000131	258 X 175 X 58	0.11	12	1.32
5	內盒(4)Product Box	BX36627063ABBA	383 X 270 X 66	0.2	6	1.2
6	保利龍板(5)Polylon board	OTPLB00PL08ABA	550 X 393 X 20	0.0284	2	0.0568
7	外紙箱(6)Carton	BX57041027CCBA	570 X 410 X 265	1.4208	1	1.4208
8						
9						
10						
11						
12						

2.一 整箱總重量 (Total LCD Weight in carton) : 5.65 Kg±10%

3.單箱數量規格表 (Packaging Specifications and Quantity) :

(1)LCM quantity per small box : no per lined with paper	1	x no of small box	1	=	1
(2)Total LCM quantity in big box : quantity per small box	1	x no of big boxes	2	=	2
(3)Total LCM quantity in carton : quantity per big box	2	x no of cartons	6	=	12



特 記 事 項 (REMARK)

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