SPECIFICATIONS

P/N: N8C2BA33

Product Name: Camera Module

Date: 2017-10-15

New Concept			
Department	R&D	Quality	Sales
Sign			

Customer			
REMARK			
Date			

Revise History

Rev	Date	Description	Author
V1.0	2017.10.15	Original Version	Johnson

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1. Product Specification

1.1 Specification

This approval sheet contains the general information of N008H81B CMOS camera module. It includes sensor, lens and VCM information. It contains the key features of the module as well as the information for the reliability test purposes.

1.2 Features

- Pixel Size : 1.12um X 1.12um, BSI
- Effective Image Size : 3673.60um (H) X 2759.68um(V)
- Resolution : 3,264H X 2,448V
- Color Filter : RGB Bayer
- Optical Format : 1/4 inch
- Frame Rate : 30fps@ QUXGA, 60fps@ Full HD 1080P(Crop), 90fps@ HD 720P
- Power Supply :
  Analog : 2.8V,
  IO : 1.8V / 2.8V
  Core(Digital) : 1.2V
- Power Consumption :
  151mW @ 30fps, QUXGA
  140mW @ 60fps, FHD 1080P(Crop)
  138mW @ 90fps, HD 720P
- ADC : 10bit
- PLL : On Chip
- Operation Temperature: -20 ~ 60°C
- Master Clock : 6 ~ 27MHz
- Output Format : RGB Bayer 10
- Windowing : Programmable
- Host Interface : two-wire serial bus interface
- Sub-Sample : 1/2, 1/4
- Image Flip : X/Y Flip

- Black Level Calibration
- Digital gain control : x1 ~ x16, (1/512 step)
- Built-in test pattern generation
- Internal PLL for high speed clock generation
- MIPI 4-Lane (Max 720Mbps on each lane)
- MIPI 2-Lane Mode (Max 1.44Gbps on each lane)
- Standby mode for power saving
- OTP 8KB
- Strobe Control : Support Xenon / LED Type
- On-chip Defect correction for couplets & Clusters
- Line-interlaced long-short output for HDR
- 2D Lens Shading Correction

1.3 Applications

- Mobile Phone Camera / Digital Still Camera
- PC Camera / Video Conference

2. General Description

2.1 Camera Module Basic Specification

NO	ITEM	SPECIFICATION	Remark
1	Type	Camera Module	
2	Model Name	N8C2BA33	
3	Resolution	3,264H X 2,448V Pixels	8-megapixel
4	Sensor	1/4″ CMOS Sensor	Hi-843B
5	Unit Pixel Size	1.12um X 1.12um	BSI
6	Output format	RGB Bayer 10	
7	Max frame rate	30fps@ QUXGA, 60fps@ Full HD 1080P(Crop), 90fps@ HD 720P	
8	Supply voltage	AVDD:2.8V;DVDD:1.2V;DOVDD1.8/2.8V	
9	Number of output	MIPI	4-lanes
10	Lens Type	AF	LARGAN40108A1
11	View angle	75.2°	Diagonal
12	Temperature Range	Operating -20°C to 60°C	
17	Module head size	8.5(W)mmx8.5(L)mmx4.8(H)mm	
18	Connection mode	金手指25PIN	FH26-25S-0.3SHW
19	Focal Length	2.93mm	
20	Resolution	Central area≥1700LW/PH;Oblique 45 degree angle≥1600LW/PH	

2.2 Camera Lens Specification

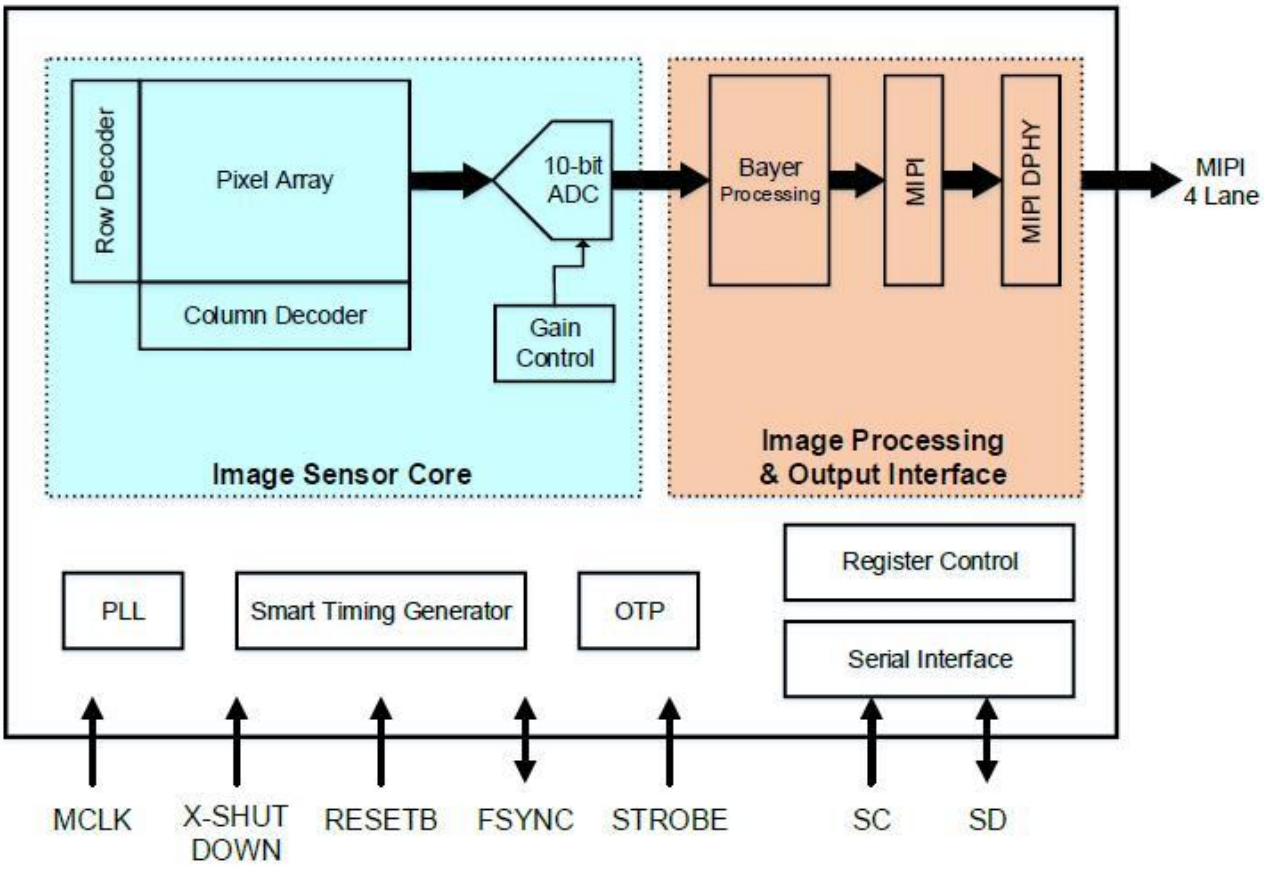
NO	ITEM	SPECIFICATION	Remark
1	Lens size	1/4inch	
2	Lens Construction	4 Plastic	
3	Focal Length	2.93mm	
4	F/NO.	2.0±5%	
5	Field of View Angle (Diagonal)	75.2°	
6	Focusing Range	10CM – ∞	
7	TV Distortion	＜1%	

2.3 Auto-Focus Specification

NO	ITEM	SPECIFICATION	Remark
1	Type (RH34M6025T70)	8.5mm×8.5mm×3.45mm	
2	VCM Current	25~40mA(Starting Current)	Rated Current＜80mA； Max Current ＜100mA
3	VCM Driver	DW9714	

2.4 Camera Module Sensor Electrical Specification

2.4.1 Block Diagram



2.4.2 DC Characteristics

Item	Symbol	Min	Typ	Max	Unit	Note
Digital Core Circuit Power Supply Voltage	$V_{DD:D}$	1.1	1.2	1.3	V	
Analog Circuit Power Supply Voltage	$V_{DD:A}$	2.6	2.8	3.0	V	
Analog Pixel Circuit Power Supply Voltage	$V_{DD:P}$	2.6	2.8	3.0	V	
Digital I/O Circuit Power Supply Voltage	$V_{DD:I}$	1.7	1.8/2.8	3.0	V	
H level Input Voltage	V_{IH}	0.7 * $V_{DD:I}$			V	
L level Input Voltage	V_{IL}			0.3 * $V_{DD:I}$	V	

2.4.3 AC Characteristics

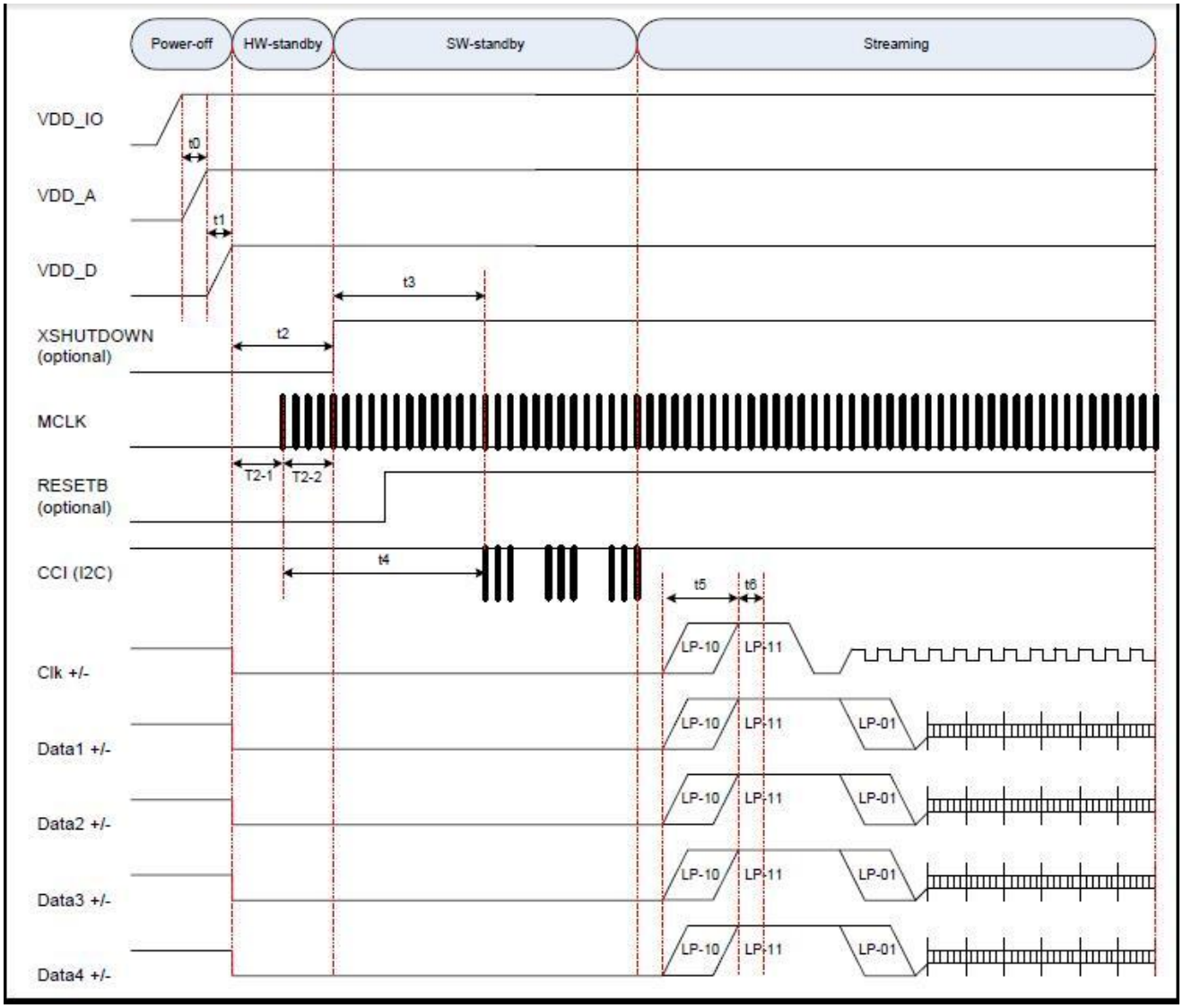
Item	Symbol	Min	Typ	Max	Unit	Note
MCLK	Frequency	6		27	MHz	
MCLK	Duty Cycle	45	50	55	%	
MCLK	Rise/Fall time			4	ns	
SC	Frequency	100		400	KHz	

2.4.4 Temperature Characteristics

Item	Symbol	Rating	Unit	Note
Storage Temperature	T_{STR}	-40 ~ 80	°C	
Functional Operating Temperature	T_{FUN}	-20 ~ 60	°C	Camera fully functional

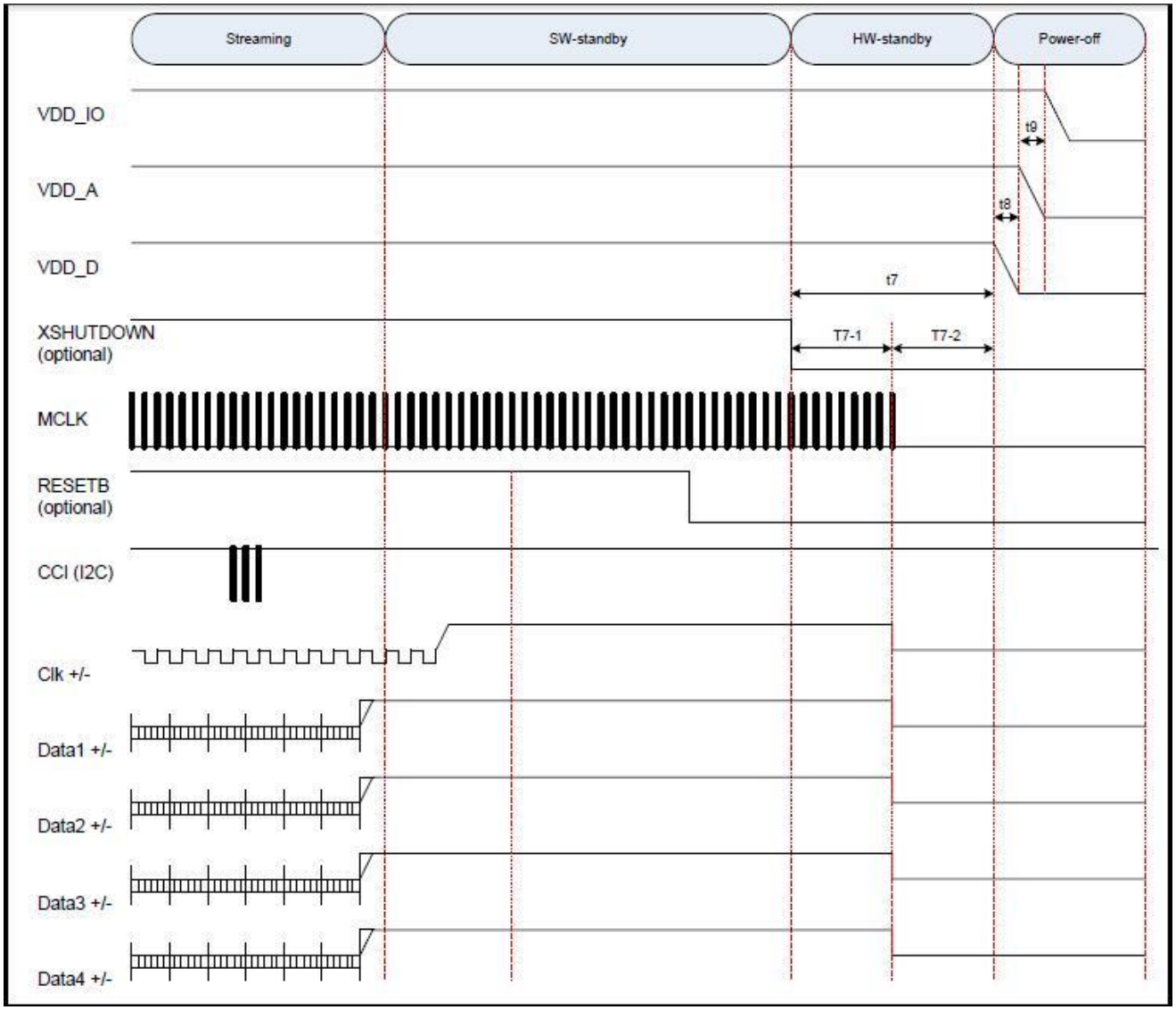
2.4.5 Power on sequence

VDDIO 2.8V/1.8V(ON) → VDDA 2.8V(ON) → VDDD 1.2V (ON) → MCLK(ON) → XSHUTDOWN(L→H) → RESETB(ON) → Set registers for normal operation → Normal Operation



2.4.6 Power off sequence

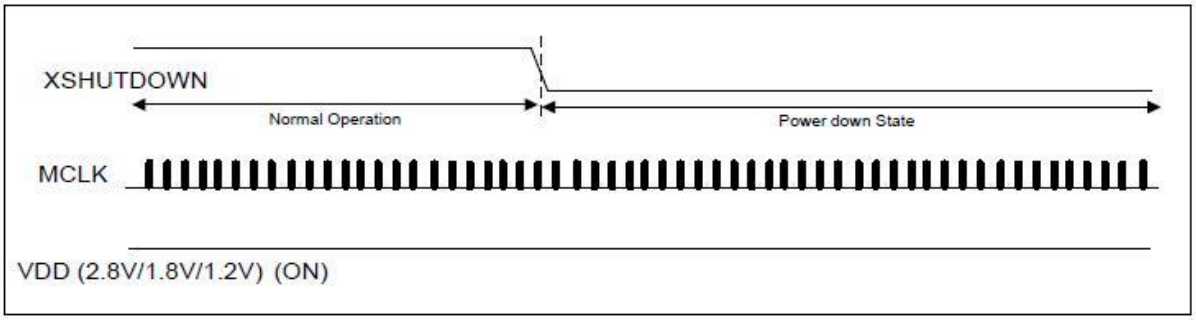
Normal Operation → Power Sleep command and disable PLL → SC, SD (OFF) → RESETB(OFF) → XSHUTDOWN(H→L)→ MCLK(OFF)→ VDDD 1.2V (OFF) → VDDA 2.8V(OFF) → VDDIO 2.8V/1.8V(OFF)



2.4.7 hardware and software standby

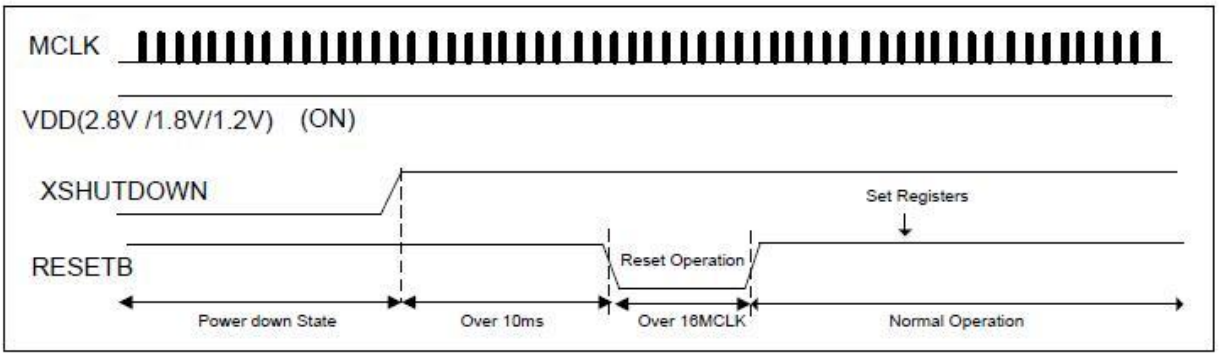
From Normal Operation State to Stand-by(Power down) State

When XSHUTDOWN is disabled, output pins go to Hi-Z.



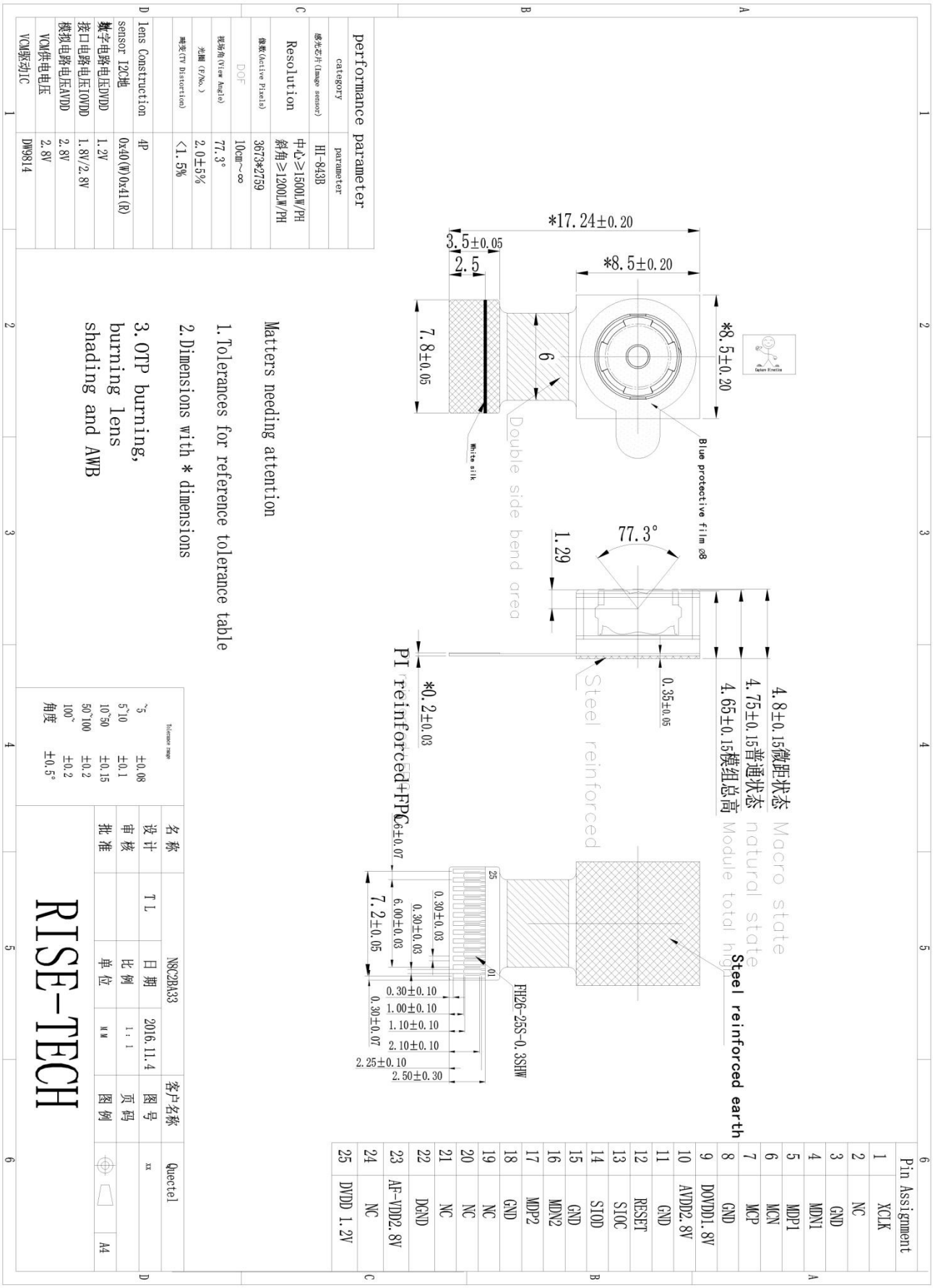
From Stand-by(Power down) State to Normal Operation State

1) Set XSHUTDOWN to Hi.
2) Wait 10ms.
3) Set RESETB from Low to Hi.
4) Set the registers for normal operation



3. Module Mechanical Drawing

3.1 Module Picture



Pin	Assignment
1	XCLK
2	NC
3	GND
4	MDN1
5	MDP1
6	MCN
7	MCP
8	GND
9	DOVDD1.8V
10	AVDD2.8V
11	GND
12	RESET
13	SIOC
14	SIOD
15	GND
16	MDN2
17	MDP2
18	GND
19	NC
20	NC
21	NC
22	DGND
23	AF-VDD2.8V
24	NC
25	DVDD 1.2V

performance parameter	
category	parameter
感光芯片(Image sensor)	HI-843B
Resolution	中心≥1500LW/PH 斜角≥1200LW/PH
像素(Active Pixels)	3673*2759
DOF	10cm~∞
视场角(View Angle)	77.3°
光圈 (F/No.)	2.0±5%
畸变(TV Distortion)	<1.5%
Lens Construction	4P
Sensor I2C地	0x40(W)0x41(R)
数字电路电压DVDD	1.2V
接口电路电压IOVDD	1.8V/2.8V
模拟电路电压AVDD	2.8V
VCM供电电压	2.8V
VCM驱动IC	DW9814

Matters needing attention

1. Tolerances for reference tolerance table
2. Dimensions with * dimensions
3. OTP burning, burning lens shading and AWB

Tolerance range	
~5	±0.08
5~10	±0.1
10~50	±0.15
50~100	±0.2
100~	±0.2
角度	±0.5°

名称			客户名称
设计	T L	N8C2BA33	Quectel
审核		日期 2016.11.4	图号 xx
批准		比例 1:1	页码
		单位 MM	图例 A4

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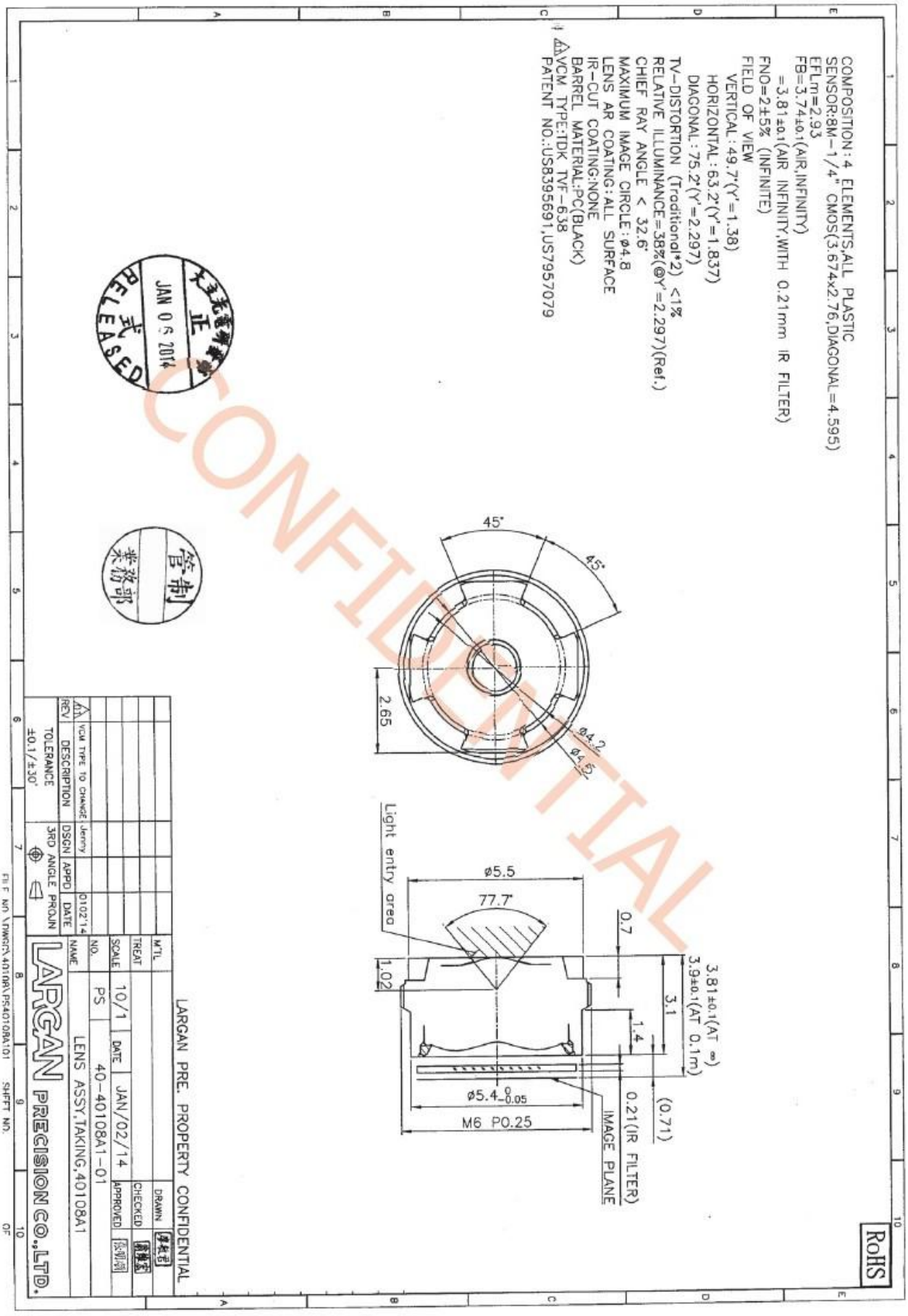
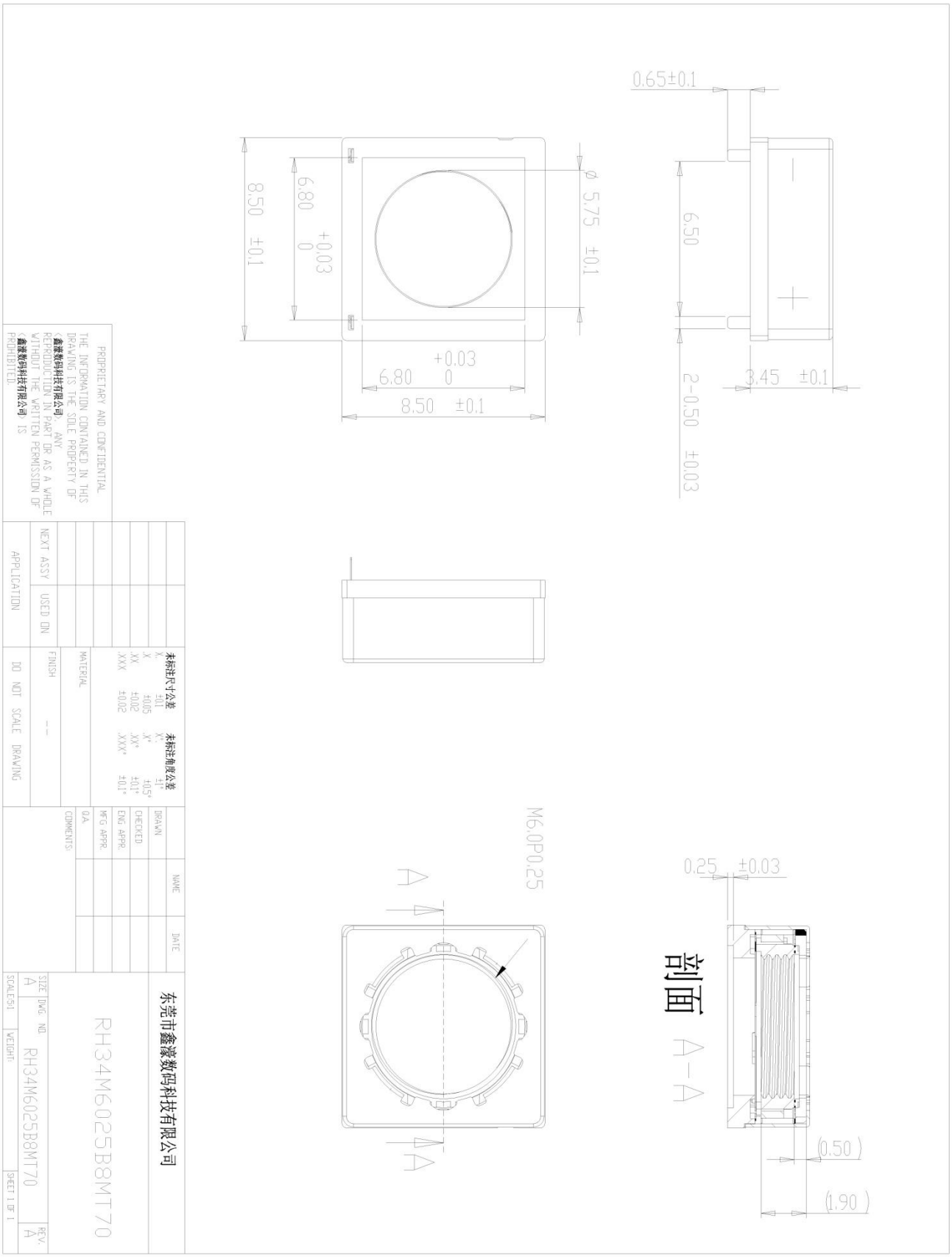
3.2 Pin Definition

Pin Number	Name	Pin Type	Function/ Description
1	XCLK	Input	Clock input
2	NC		
3	GND	Ground	Digital ground
4	MDN1	Output	MIPI TX first data lane positive output
5	MDP1	Output	MIPI TX first data lane negative output
6	MCN	Output	MIPI TX clock lane negative output
7	MCP	Output	MIPI TX clock lane negative output
8	GND	Ground	Digital ground
9	VDD_IO	Power	Digital power for I/O (1.8V)
10	AVDD	Power	Analog power(2.8V)
11	GND	Ground	Digital ground
12	RESETB	Input	Master reset signal, active LOW (can be
13	SIOC		
14	SIOD		
15	GND	Ground	Digital ground
16	MDP2	Output	MIPI TX second data lane negative output
17	MDN2	Output	MIPI TX second data lane positive output
18	GND	Ground	Digital ground
19	NC		
20	NC		
21	NC		
22	GND	Ground	Digital ground
23	VCM_VDD	Power	Motor power(2.8V)
24	NC		
25	DVDD	Power	Power supply for VDD (1.2V)

3.3 Lens drawing



3.4 VCM drawing



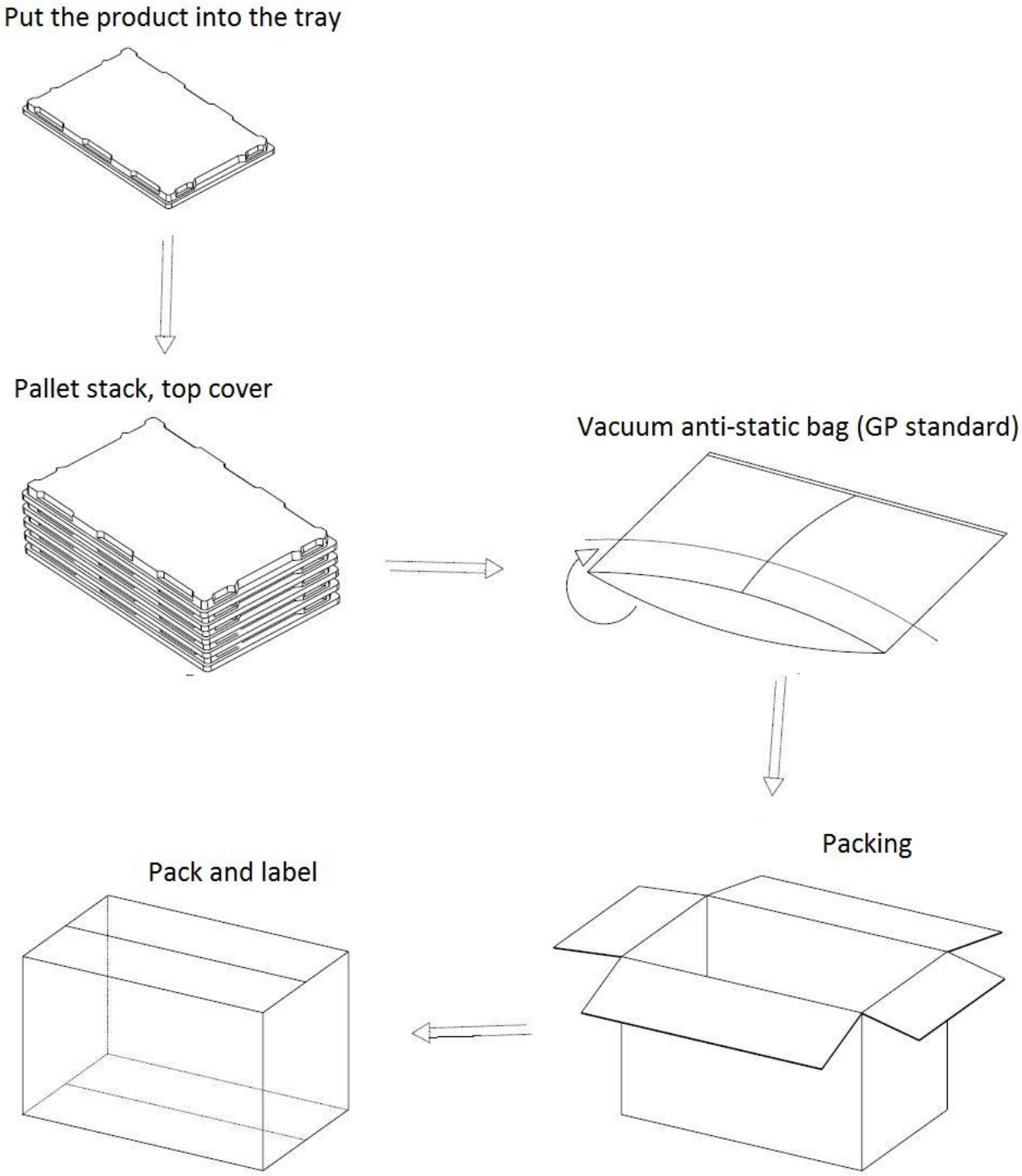
4. Reliability Test Items and Criteria

NO	Test item	Test condition	Test Qty'	Judgment standard
1	Low temperature storage test	Temperature: -40℃ Duration: 96hrs	5	Module normal work / image test standard
2	High Temperature Storage Test	Temperature: 80℃ Duration: 96hrs	5	Module normal work / image test standard
3	High Temperature / Humidity Storage Test	Temperature: 60℃ Humidity: 95%RH Duration: 96hrs	5	Module normal work / image test standard
4	High Temperature / Humidity operation Test	Temperature: 60℃ Humidity: 90%RH Duration: 48hrs operation	5	Module normal work / image test standard
5	Thermal Shock Test	Temperature:-40°C± 3 ℃ (45min)~85°C ± 3 ℃(45min) Chang time≦15sec; Totally 24cycles	5	Module normal work / image test standard
6	High temp operation	Temperature: 70℃ Duration: 48hrs operation	5	Module normal work / image test standard
7	Low temp operation	Temperature: -20℃ Duration: 48hrs Max Work Voltage	5	Module normal work / image test standard
8	28Days humidity &high temp Test（By Phone）	Temp：50±2℃，Humidity：95%(+2%/-3%)，Time：28Days，check it per 2days	5	Module normal work / image test standard
9	28Days temp cycle Tes	1.25±2℃ last 6Hr 2.Follow this cycle 3times and per cycle 6Hr： - From +25±2℃ to +55±2℃ in 30 minutes, then last 2Hr at +55±2℃; - From +55±2℃ to -20±3℃ in 1Hr, then last 2Hr at -20±3℃; - From -20±3℃ to +25±2℃ in 30minutes;	5	Module normal work / image test standard
10	Module Vibration test	Frequency Range:10-55-10Hz;Amplitude:2mm;TestAxies(X,Y,Z);Duration:30min for Each Axis	5	Module normal work / image test standard
11	ESD test	6KV Contact Discharge;10KV Air Discharge;10 time,1time/Second Or Follow supplier spec	5	Module normal work / image test standard
12	Drop Test	a.150cm high drop, 4 corners, 6 planes; 2 cycles;(performed with 100g weight jig, free drop), Marble ground b.150cm high drop, 4 corners, 6 planes; 2 cycles, Marble ground	5	Module normal work / image test standard

13	Pressure Test	Surface pressure: FF 5kgf,AF 8kgf; Point Pressure: 2kgf; Pressure Head speed: 10mm/min; Pressure Head size: surface Jig > Camera surface, point Jig=Φ1mm; Pressure Positon: Jig center and camera aline;	5	Module normal work / image test standard
14	FPC Bending Test	Place the 1mm metal rod in the bending position up and down, bending FPC +/-90 degrees or +/-180 Degree, 50 times. (The bending position is defined according to the project design and material)	5	Module normal work / image test standard
15	FPC/BTB Conn	20 times	5	Module normal work /
16	Packaging drop test	Follow supplier spec	5	Module normal work / image test standard
17	Packaging vibration test	Follow supplier spec	5	Module normal work / image test standard

5. Packaging Information

1. Every module is placed into a tray until all empty slots of a tray are filled.
2. Each tray use an anti-static bag to prevent the module from moisture by partially socking out the air from the stack.
3. A stack have 10 trays.
4. Insert a stack into a inner box.
5. Insert two inner boxes into a outside box. Then attach the label onto the outside box.



6. Storage and Operating Conditions

To keep the product and packaging material in good condition, care must be taken to control temperature and humidity in the storage area.

Recommended conditions:

Ambient temperature: 0～+40℃

Humidity: 30～70%RH

No rapid change on temperature and humidity.
The products listed in this catalog are not designed for use under the following conditions.
Storage and/or usage under following conditions is prohibited.
1). Exposure to corrosive gas such as chlorine, hydrogen sulfide, ammonia, sulfur dioxide,nitrogen oxide, etc.
2). Exposure to direct sunlight.
3). Exposure to dust.
4). Exposure to excessive moisture or wet locations.
5). Exposure to salt water or sea breezes.
6). Exposure to strong static electricity or electromagnetic waves.

7. Transportation and Handling

1). Minimize any mechanical vibration or shock and avoid dropping of the product during transportation or dropping the product that contains the substrate.
2). Since the application of static electricity or over voltage may cause defect in the product or deterioration of its reliability, caution must be taken against exposure to any static electricity generated by electrified items such as workbenches, soldering irons, tools,carrying containers, etc.
3). Caution shall be taken to avoid overstress to the product.