



承認書

APPROVAL SHEET

客戶:

Customer: Shenzhen Sunnywale Inc

料號:

Part No#: OV13850

機種名:

Project Name:

開發代號: OS-130053

Develop No:

品名: OV13850 13M TDK PLCC Type

Description

日期: 2013/11/10

Approval Date

Confirmed By 確認	單位 Company	客戶 Customer	旺福電子 WF
	簽章 Signature	Sunnywale Inc	

Preliminary Data Sheet

July.04.2013

(Revision 1.2)

DG WF-S-2013-25



Document Revision History

Revision	Date	Description	Released
1.0	10/11/2013	First draft	Danise Hong
1.1	06/11/2014	Change the Electronic component location on page 5	Danise Hong
1.2	07/04/2014	Change the C1-C3 are 1.0Uf on page 14	Danise Hong



目 錄

1. General Description	4
2. Mechanical Specifications (unit: mm)	5
3. Features	6
4. Logical Symbol Diagram	
5. Signal Description	7
5. Signal Description.....	8
5.1 Pin Assignment (Top View)	8
5.2 Pin Signal Description	9
6. Electrical Characteristics	11
6.1. Operating specifications	11
6.1. 1 Absolute maximum rating	11
6.1. 2 Functional temperature	11
6.2. DC Characteristics:.....	12
7. Internal Schematic	
8. Test Specification	14
8. Test Specification	15
8.1 Image Quality Criteria	15
8.2 Function test.....	16
8.2.1 Blemish Test:.....	16
8.2.2 Black Test:.....	17
8.2.3 White Pixel Test:.....	18
9. Inspection SPEC	19
10. Reliability and Environmental Test Specifications	24
10.1 Test Flow	24
10.2 Test Item	24
10.3 Classification Reflow Profile	25
11. Packing Specification.....	27
12. Reference	27
13. Appendix	27



1. General Description

The OV13850 color image sensor is a low voltage, high performance 1/3.06-inch 13.2 megapixel CMOS image sensor that provides the functionality of a single 13.2 megapixel (4224×3136) camera using OmniBSI+™ technology. It provides full-frame, sub-sampled, windowed 10-bit MIPI images in various formats via the control of the Serial Camera Control Bus (SCCB) interface.

The OV13850 has an image array capable of operating at up to 24 frames per second (fps) in 10-bit 13.2 megapixel resolution with complete user control over image quality, formatting and output data transfer. All required image processing functions, including exposure control, white balance, defective pixel canceling, etc., are programmable through the SCCB interface.

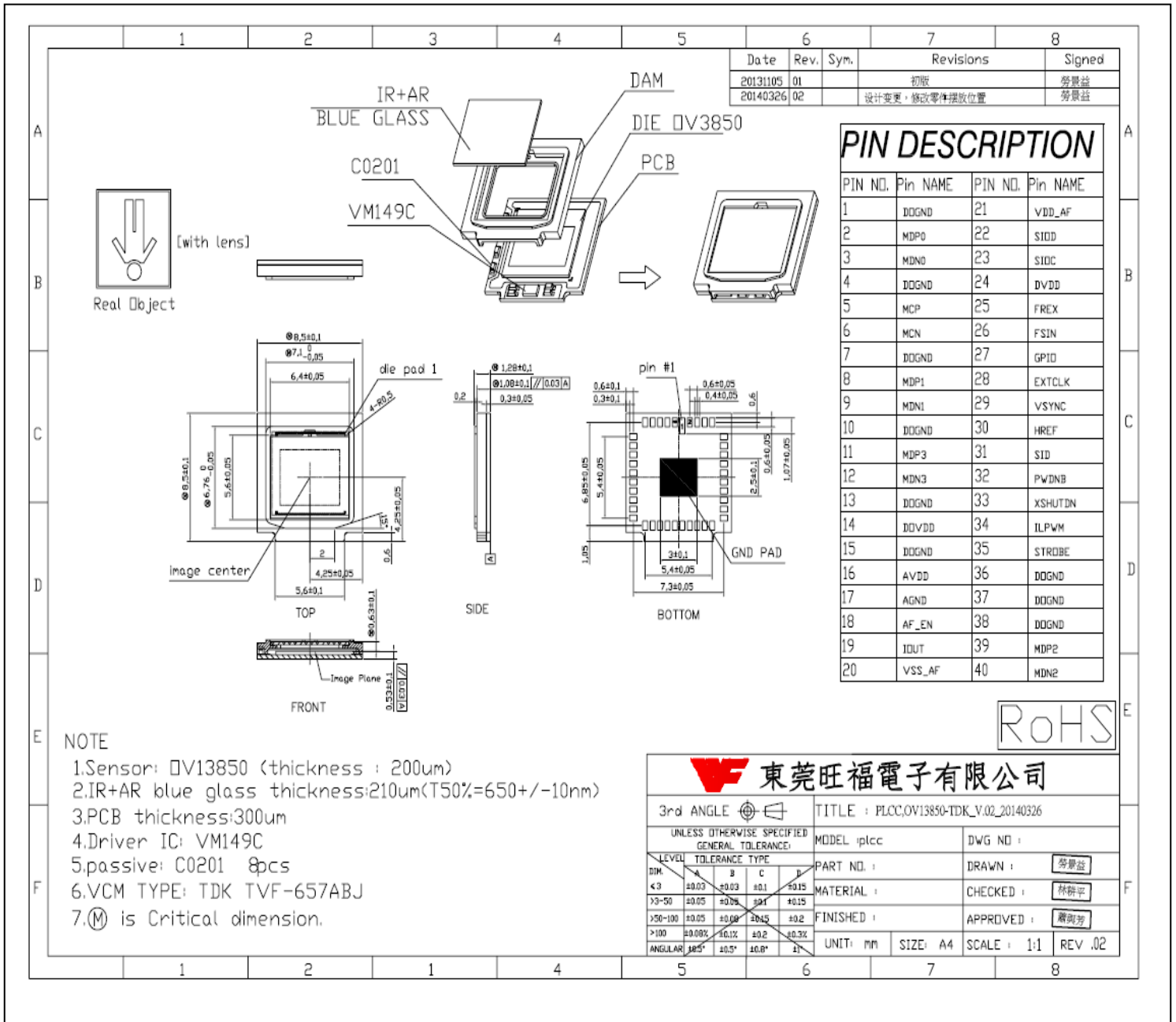
In addition, OmniBSI image sensors use proprietary sensor technology to improve image quality by reducing or eliminating common lighting/electrical sources of image contamination, such as fixed pattern noise, smearing, etc., to produce a clean, fully stable, color image.

For customized information purposes, the OV13850 includes a one-programmable (OPT) memory. The OV13850 has up to four lanes of MIPI interface.

The OV13850 is suitable for low power camera module .



2. Mechanical Specifications (unit : mm)



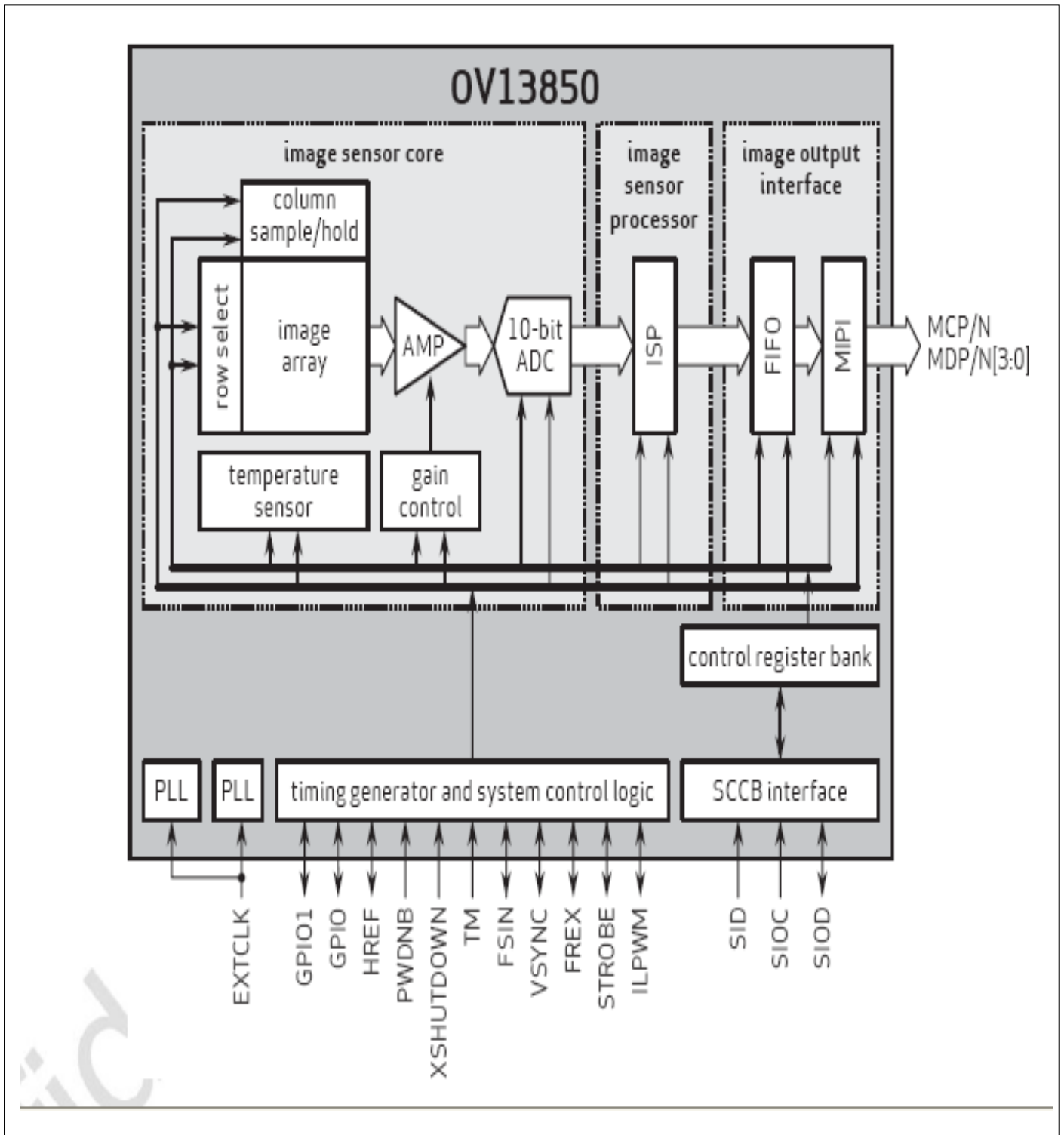


3. Features

- ◆ Lens size:1/3.06 inch
- ◆ Pixel size:1.12mm×1.12mm
- ◆ 31.2° CRA for<6mm z-height
- ◆ Programmable controls for frame rate, mirror and flip, cropping and windowing
- ◆ 13.2MP AT 30fps
- ◆ Two-wire serial bus control(SCCB)
- ◆ Strobe output to control flash
- ◆ Supports output formats:10-bit RAW RGB
- ◆ Supports image sizes:13.2MP(4224×3136),10MP(4224×2376),4K2K(3840×2160), EIS 1080P (2112×1188),EIS 720P(1408×792),and more3
- ◆ Support 2×2 binning
- ◆ Up to 4-lane MIPI serial output interface
- ◆ Standard serial SCCB interface
- ◆ 8kbits of embedded one-time programmable(OTP) memory(see sidebar note)
- ◆ Two on-chip phase lock loop(PLLs)
- ◆ Programmable controls: gain, exposure, frame rate, image size, horizontal mirror, vertical flip cropping, and panning
- ◆ Built-in temperature sensor
- ◆ Image quality controls: defect correction, automatic black level calibration, lens shading correction ,and altimeter row HDR.
- ◆ Guaranteed sensor junction temperature: -30⁰C to +85⁰C
- ◆ Power Supply:Core:1.14V-1.26V,analog:2.6-3.0V I/O:1.7-3.0V



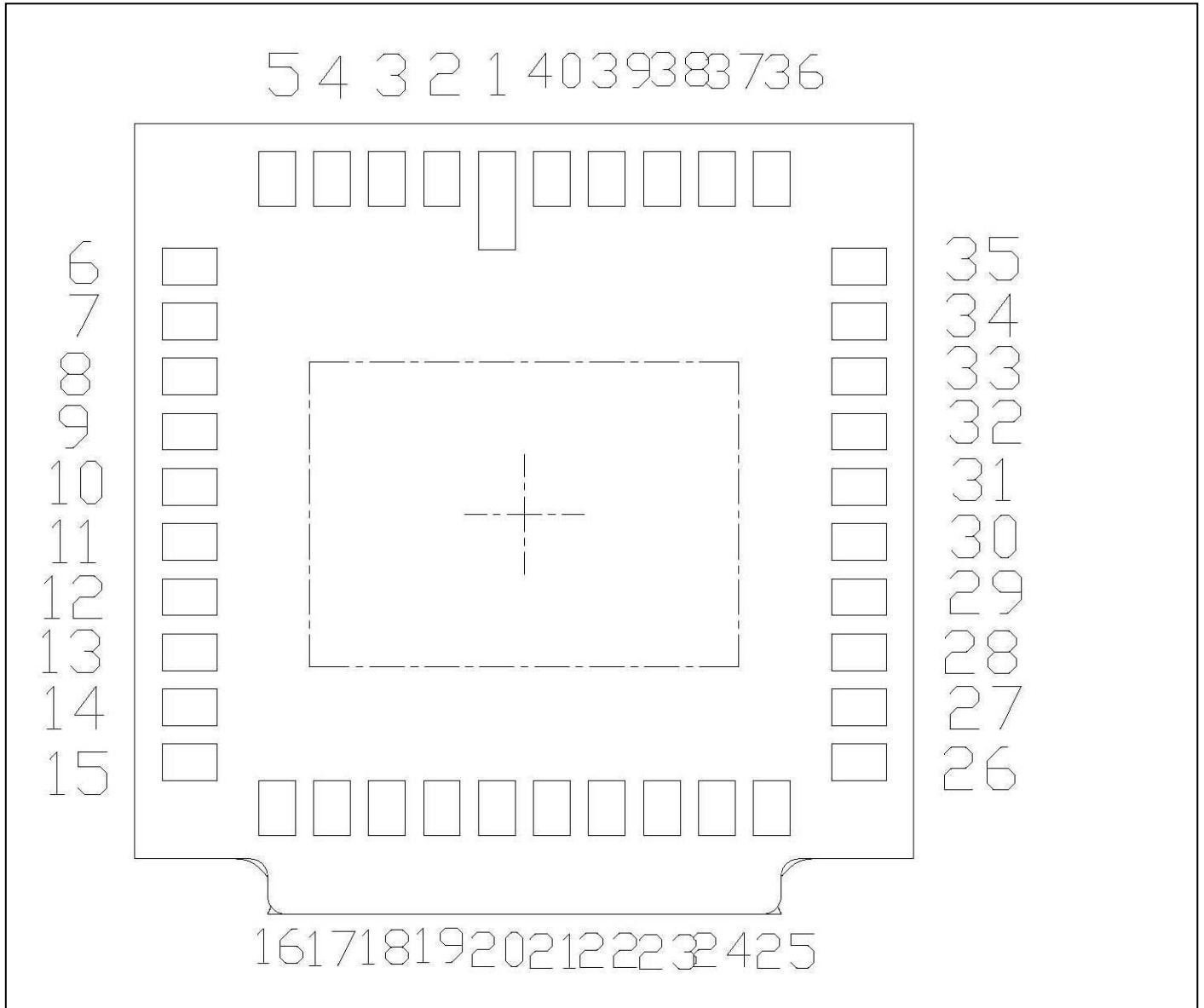
4. Logical Symbol Diagram





5. Signal Description

5.1 Pin Assignment (Top View)





5.2 Pin Signal Description

Pin No	Pin Name	I/O	Description
1	DOGND	GND	Ground for I/O circuit
2	MDP0	I/O	MIPI TX data lane 0 positive output
3	MDN0	I/O	MIPI TX data lane 0 negative output
4	DOGND	GND	Ground for I/O circuit
5	MCP	Output	MIPI Clock positive output
6	MCN	Output	MIPI Clock negative output
7	DOGND	GND	Ground for I/O circuit
8	MDP1	I/O	MIPI TX data lane 1 positive output
9	MDN1	I/O	MIPI TX data lane 1 negative output
10	DOGND	GND	Ground for I/O circuit
11	MDP3	I/O	MIPI TX data lane 3 positive output
12	MDN3	I/O	MIPI TX data lane 3 negative output
13	DOGND	GND	Ground for I/O circuit
14	DOVDD	Power	Power for I/O circuit
15	DOGND	GND	Ground for I/O circuit
16	AVDD	Power	Power for analog circuit
17	AGND	GND	Ground for analog circuit
18	AF_EN	IN	Shutdown mode (active low)
19	IOUT	OUT	Current sink for Actuator
20	VSS_AF	GND	AF Ground
21	VDD_AF	Power	AF power
22	SIOD	I/O	SCCB data
23	SIOC	Input	SCCB clock
24	DVDD	Reference	Power for digital circuit
25	FREX	I/O	Frame exposure input
26	FSIN	I/O	Frame sync input
27	GPIO	I/O	General purpose I/O
28	EXTCLK	Input	System input clock
29	VSYNC	I/O	VSYNA output
30	HREF	I/O	HREF output
31	SID	Input	SCCB ID select 0:SCCB derive address0*20 1:SCCB derive address0*6c



Pin No	Pin Name	I/O	Description
32	PWDNB	Input	Power down(active low with internal pull down resistor)
33	XSHUTDN	Input	Reset and power down(active low with in tamale pull down resistor)
34	ILPWM	I/O	illumination control
35	STROBE	I/O	strobe output
36	DOGND	GND	Ground for I/O circuit
37	DOGND	GND	Ground for I/O circuit
38	DOGND	GND	Ground for I/O circuit
39	MDP2	I/O	MIPI TX data lane 2 positive output
40	MDN2	I/O	MIPI TX data lane 2 negative output



6. Electrical Characteristics

6.1. Operating specifications

6.1. 1 Absolute maximum rating

parameter		absolute maximum rating ^a
ambient storage temperature		-40°C to +125°C
supply voltage (with respect to ground)	V_{DD-A}	4.5V
	V_{DD-D}	3V
	V_{DD-IO}	4.5V
electro-static discharge (ESD)	human body model	2000V
	machine model	200V
all input/output voltages (with respect to ground)		-0.3V to $V_{DD-IO} + 1V$
I/O current on any input or output pin		± 200 mA

- a. exceeding the absolute maximum ratings shown above invalidates all AC and DC electrical specifications and may result in permanent damage to the device. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

6.1.2 Functional temperature

parameter	range
operating temperature ^a	-30°C to +85°C junction temperature
stable image temperature ^b	0°C to +60°C junction temperature

- a. sensor functions but image quality may be noticeably different at temperatures outside of stable image range
b. image quality remains stable throughout this temperature range



6.2.DC Characteristics:

symbol	parameter	min	typ	max	unit
supply					
V_{DD-A}	supply voltage (analog)	2.6	2.8	3.0	V
V_{DD-D}	supply voltage (digital core)	1.14	1.2	1.26	V
V_{DD-IO}	supply voltage (digital I/O)	1.7	1.8	3.0	V
I_{DD-A}	active (operating) current		35		mA
I_{DD-D}			100		mA
I_{DD-IO}			3		mA
$I_{DDS-SCCB}$	standby current ^a		250		μ A
$I_{DDS-PWDN}$			250		μ A
$I_{DDS-XSHUTDOWN}$			1		μ A
digital inputs (typical conditions: AVDD = 2.8V, DVDD = 1.2V, DOVDD = 1.8V, EVDD = 1.2V)					
V_{IL}	input voltage LOW			0.54	V
V_{IH}	input voltage HIGH	1.26			V
C_{IN}	input capacitor			10	pF
digital outputs (standard loading 25 pF)					
V_{OH}	output voltage HIGH	1.62			V
V_{OL}	output voltage LOW			0.18	V
serial interface inputs					
V_{IL}^b	SIOC and SIOD	-0.5	0	0.54	V
V_{IH}	SIOC and SIOD	1.28	1.8	3.0	V

a. standby current is measured at room temperature

b. based on DOVDD = 1.8V

6.3 AC Characteristics:

symbol	parameter	min	typ	max	unit
inputs					
f_{CLK}	input clock frequency	6	24	64	MHz
t_{CLK}	input clock period		41.67		ns
$t_{CLK:DC}$	clock duty cycle	45	50	55	%

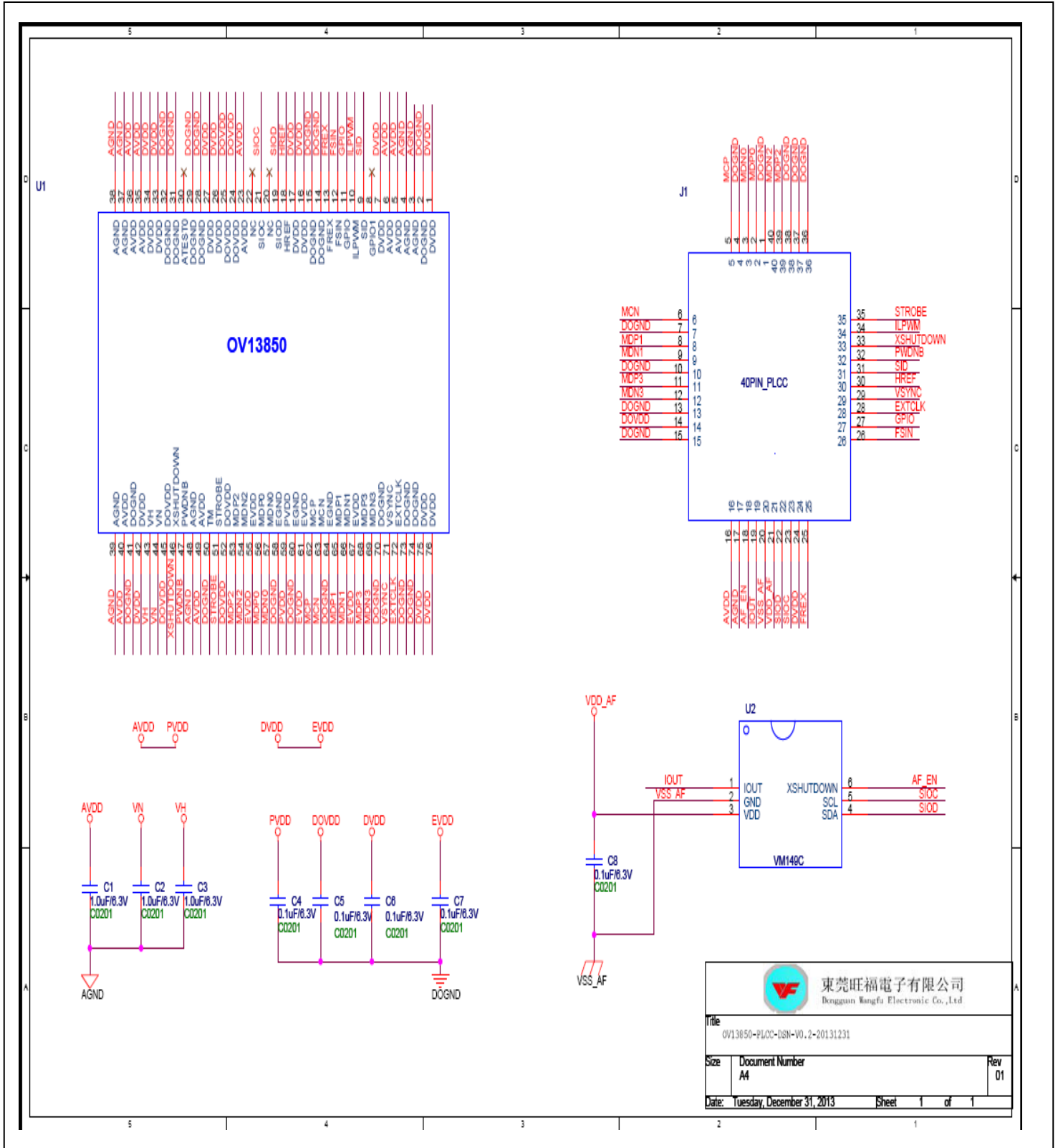


6.4 timing characteristics

symbol	parameter	min	typ	max	unit
oscillator and clock input					
f_{osc}	frequency (EXTCLK)	6	24	64	MHz
t_p , t_f	clock input rise/fall time			TBD	ns



7. Internal Schematic





8. Test Specification

8.1 Image Quality Criteria

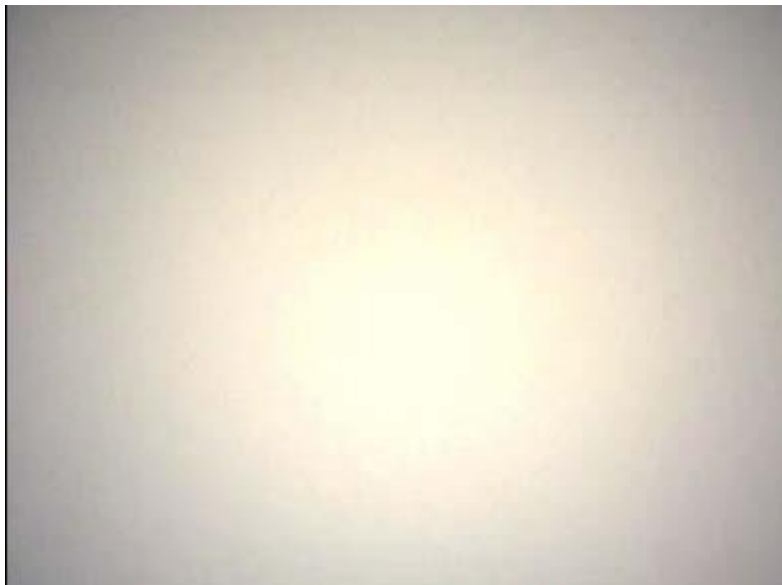
Test item	Description	Passing Criteria
Blemish	<p>[Note:] Zone A = Image * 16% Zone B = Image * 48% Zone C = Image * 32% Zone D = Image * 4%</p>	Block A: Depth →8 Block B: Depth →11 Block C: Depth →11 Block D: Depth →12
Black Pixel	<p>[Note] Block A and Block B Distribution</p>	Block A: Depth →45% Block B: Depth →55%, Block A: Size →1 x 1 Pixel Block B: Size →1 x 1 Pixel
White Pixel	<p>[Note] Block A and Block B Distribution</p>	Block A: Depth →38%, Block B: Depth →38%, Block A: Size →1 x 1 Pixel Block B: Size →1 x 1 Pixel
Loss Bit		Not accepted
Dead Line		Not accepted



8.2 Function test

8.2.1 Blemish Test:

- Chart: Light Panel for Inspection
- Fixture: Standard lamp box
- Program: Camera Test
- Test Distance: 0

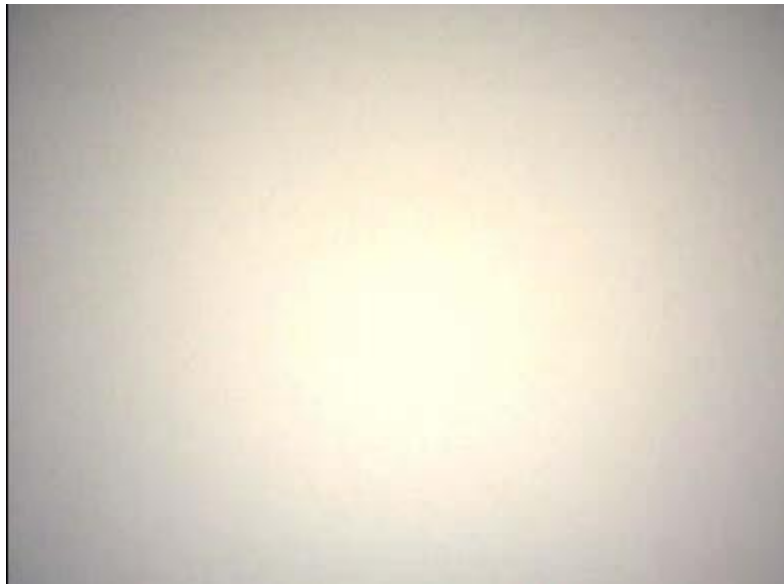


Block A: Depth →8 Block B: Depth →11
Block A: Depth →11 Block B: Depth →12



8.2.2 Black Test:

- Chart: Light Panel for Inspection
- Fixture: Standard lamp box
- Program: Camera Test
- Test Distance: 0



Block A: Depth →45% Block B: Depth →55%
Block A: Size →1 x 1 Pixel, Block B: Size →1 x 1 Pixel.



8.2.3 White Pixel Test:

- Chart: Light Panel for Inspection
- Fixture: Standard lamp box
- Program: Camera Test
- Test Distance: 0



Block A: Depth →38%

Block B: Depth →38%

Block A: Size →1 x 1 Pixel, Block B: Size →1 x 1 Pixel.



9. Inspection SPEC

PLCC 成品檢驗標準書



東莞旺福電子有限公司
Dongguan Wangfu Electronic Co., Ltd

檢驗工序	成品檢驗	文件編號	WF-QCD-S-001-Y001	編制	章金月	標準化/日期	
產品名稱	PLCC	版本	R1.0	發布日期	2012/11/14	批准/日期	
產品型號	通用(除特別幾種以外)	頁數	1/7	審核/日期		工程會簽/日期	

序號	檢驗項目	明細名稱	檢驗要求	缺點等級	檢驗方式		圖例說明		檢驗手法及設備
					II	AQL	標準	拒收	
1	功能	F/T	電流值: 100-150	主缺	抽檢	0.1			測試治具/目視
		Particle Elemish Black Pixel White Pixel	1. 依功能影像測試程式判定之結果, 並分等級為A+, A, B, C, D, E, 級 2. 影像畫面不可有黃斑, 膠印, 線條, 水紋	主缺	抽檢	0.1			測試軟件/目視

作業重點

抽驗標準

更改記錄

1. 操作人員需正確配戴手指套、靜電手環, 作業時將靜電手環接地。
2. 要保持工作台面和設備及定工器具清潔。

允收品質水準AQL按MIL-STD-105E 一般檢驗水準
II級單次抽樣計劃執行

更改前	更改後	更改者	日期



PLCC 成品檢驗標準書											
東莞旺福電子有限公司 Dongguan Wangfu Electronic Co., Ltd		檢驗工序	成品檢驗	文件編號	WF-QCD-S-001-Y001	編制	章金月	標準化/日期			
		產品名稱	PLCC	版本	R1.0	發布日期	2012/11/14	批准/日期			
		產品型號	通用(除特別機種以外)	頁數	2/7	審核/日期		工程部會簽/日期			
序號	檢驗項目	明細名稱	檢驗要求	缺點等級	檢驗方式		圖例說明			檢驗手法及設備	
					II	AQL	標準		拒收		
2	外觀	逃氣孔漏點或點膠不完全	不可有	主缺	抽檢		0.1				10-15倍顯微鏡
		Sensor刮傷, 麟點, (非感光區)	依功能影像測試程式判定結果為準 若有麟點, 輕輕敲擊3次后不可移動, 可判為良品	次缺	抽檢		1.0				10-15倍顯微鏡 測試治具
		Sensor刮傷, 麟點, (感光區)	功能影像測試程式判定結果為準	次缺	抽檢		1.0				10-15倍顯微鏡 測試治具
作業重點					抽驗標準			更改記錄			
1. 操作人員需正確配戴手指套、靜電手环, 作業時將靜電手环接地。 2. 要保持工作台面和設備及定工治具清潔。					允收品質水準AQL按MIL-STD-105E 一般檢驗水準 II級單次抽樣計劃執行			更改前	更改後	更改者	日期



PLCC 成品檢驗標準書



東莞旺福電子有限公司
Dongguan Wangfu Electronic Co., Ltd

檢驗工序	成品檢驗	文件編號	WF-QCD-S-001-Y001	編制	韋金月	標準化/日期	
產品名稱	PLCC	版本	R1.0	发布日期	2012/11/14	批准/日期	
產品型號	通用(除特別機種以外)	頁數	3/7	審核/日期		工程會簽/日期	

序號	檢驗項目	明細名稱	檢驗要求	缺點等級	檢驗方式		圖例說明		檢驗手法及設備
					II	AQL	標準	拒收	
2	外觀	IR刮傷	功能影像測試程式需判定結果為準(無感刮傷以功能判定結果為準,有感刮傷不允收)	次缺	抽檢	1.0			10-15倍顯微鏡 測試治具
		IR溢膠, 髒污	1. IR內溢膠不可到感光區 2. IR下表面不允許有可擦拭髒污 3. IR下表面殘膠以功能判定OK 4. IR下不可移動毛絲異物類目視可見者NG.	次缺	抽檢	1.0			10-15倍顯微鏡
		IR翹起, 破損, 斷膠	1. IR上翹超出DAM最高邊沿不允收。(若是DAM的4角有臺階,以臺階下的邊沿為準) 2. IR邊緣破損長度不可超過邊緣總長的1/4,寬度不可超過點膠道 3. IR缺角在DAM內圓座標外可允收; 4. 崩碎,破損,已產生縫隙、裂痕不允許,破損超過點膠區不允許 5. IR斷膠不允許	次缺	抽檢	1.0			10-15倍顯微鏡
		IR內水汽	不允許	主缺	抽檢	0.1			10-15倍顯微鏡

作業重點

抽驗標準

更改記錄

1. 操作人員需正確配戴手套、靜電手環, 作業時將靜電手環接地。
2. 要保持工作台面和設備及定工治具清潔。

允收品質水準AQL按MIL-STD-105E 一般檢驗水準
II級單次抽樣計劃執行

更改前	更改後	更改者	日期



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序號	檢驗項目	明細名稱	檢驗要求	缺點等級	檢驗方式		圖例說明		檢驗手段及設備
					II	AQL	標準	拒收	
2	外觀	DAM	1. DAM破損不有收	主缺	抽檢	0.1			10-15倍顯微鏡
			1. DAM表面溢膠影響組裝者NG。 2. DAM熔傷不可超出整體平面的平整度	次缺	抽檢	1.0			
		基板裸銅破損&刮傷	基板的刮痕不可造成露銅，且不可造成組裝或造成影像不良	次缺	抽檢	1.0		10-15倍顯微鏡	
		Pad裸銅破損	不允許	次缺	抽檢	1.0			
Pad刮傷	刮傷不可超過2/3Pad的寬度且不可造成露銅或影像不良	次缺	抽檢	1.0		10-15倍顯微鏡			

第 4 頁

作業重點	抽驗標準	更改記錄			
1. 操作人員需正確配戴手指套、靜電手環，作業時將靜電手環接地。 2. 要保持工作台面和設備及定工治具清潔。	允收品質水準AQL按MIL-STD-105E 一般檢驗水準 II級單次抽樣計劃執行	更改前	更改後	更改者	日期



PLCC 成品檢驗標準書



東莞旺福電子有限公司
Dongguan Wangfu Electronic Co., Ltd

檢驗工序	成品檢驗	文件編號	WF-QCD-S-001-Y001	編制	韋金月	標準化/日期	
產品名稱	PLCC	版本	R1.0	發布日期	2012/11/14	批准/日期	
產品型號	通用(除特別幾種以外)	頁數	5/7	審核/日期		工程部門簽/日期	

序號	檢驗項目	明細名稱	檢驗要求	缺點等級	檢驗方式		圖例說明		檢驗手段及設備
					II	AQL	標準	拒收	
2	外觀	電容	電容不可有損傷, 掉落	主缺	抽檢	0.1			10-15倍顯微鏡
		IC	IC不可有空焊及漏焊	主缺	抽檢	0.1			10-15倍顯微鏡
		Pad殘膠氧化	不可有	次缺	抽檢	1.0			10-15倍顯微鏡
		文字打標	1. 目視需可以辨識文字內容(英文與數字) 2. 內容不可有錯誤	主缺	抽檢	0.1			10-15倍顯微鏡
3	尺寸	尺寸檢驗	對產品的長寬高進行量測	主缺	抽檢	0.1	依圖紙	/	卡尺

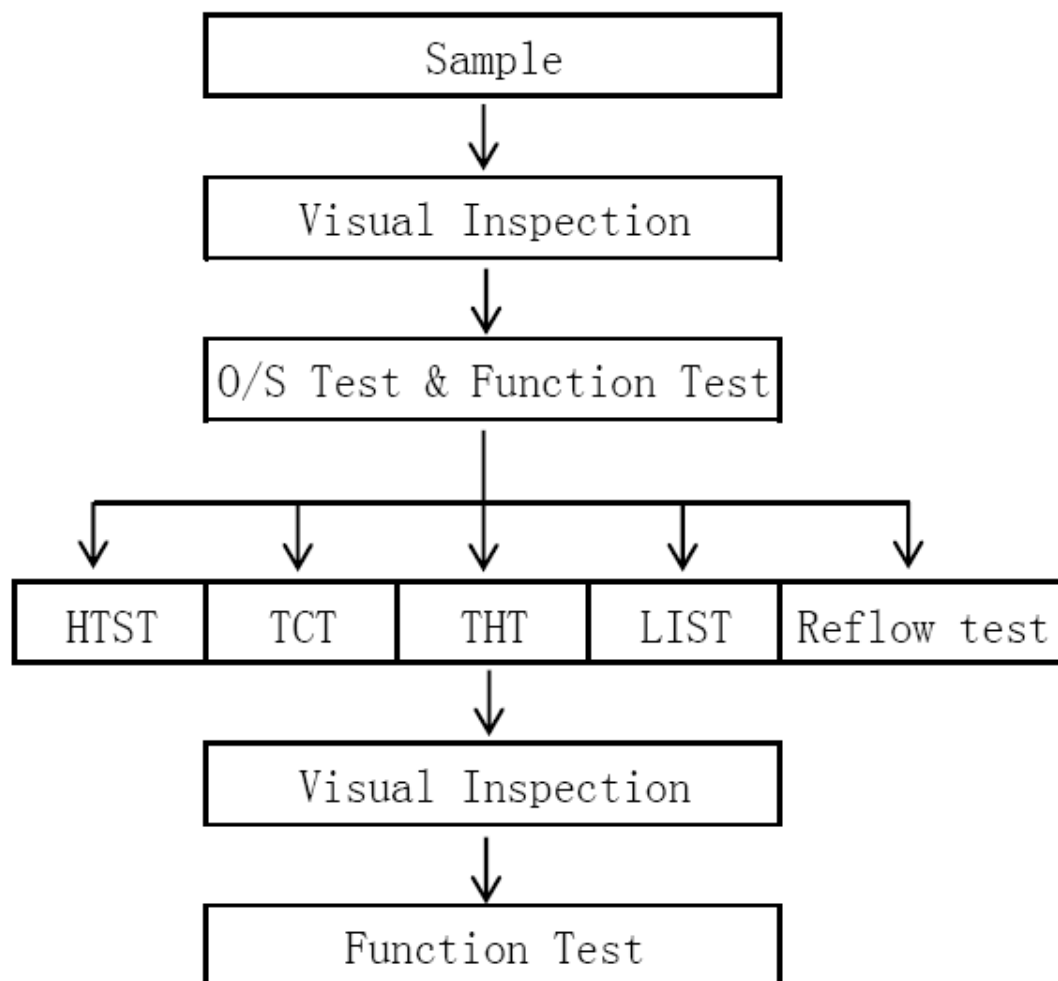
第 5 頁

作業重點	抽驗標準	更改記錄			
		更改前	更改後	更改者	日期
1. 操作人員需正確配戴手指套、靜電手環, 作業時將靜電手環接地。 2. 要保持工作台面和設備及定工工具清潔。	允收品質水準AQL按MIL-STD-105E 一般檢驗水準II級單次抽樣計劃執行				



10. Reliability and Environmental Test Specifications

10.1 Test Flow



10.2 Test Item

Item	Ref.Spec	Test Condition	Criteria	Acc / Rej
HTST	IEC60068-2-1	Temp : 85°C Time : 48 hrs	Function Test	0/1



TCT	IEC60068-2-1 IEC60068-2-2 IEC60068-2-14	Temp : -20°C ~+60°C Dwell : 45min Frequency 27 cycles	Function Test	0/1
THT	MIL-STD-883E 1004	Temp : 40°C Humidity : 95%RH Time : 120 hrs	Function Test	0/1
LTST	IEC60068-2-1	Temp : -40°C Time : 48 hrs	Function Test	0/1
Reflow Test	JEDEN C020B	Spec : Reflow Profile Time : 3 cycles	Function Test	0/1

10.3 Classification Reflow Profile

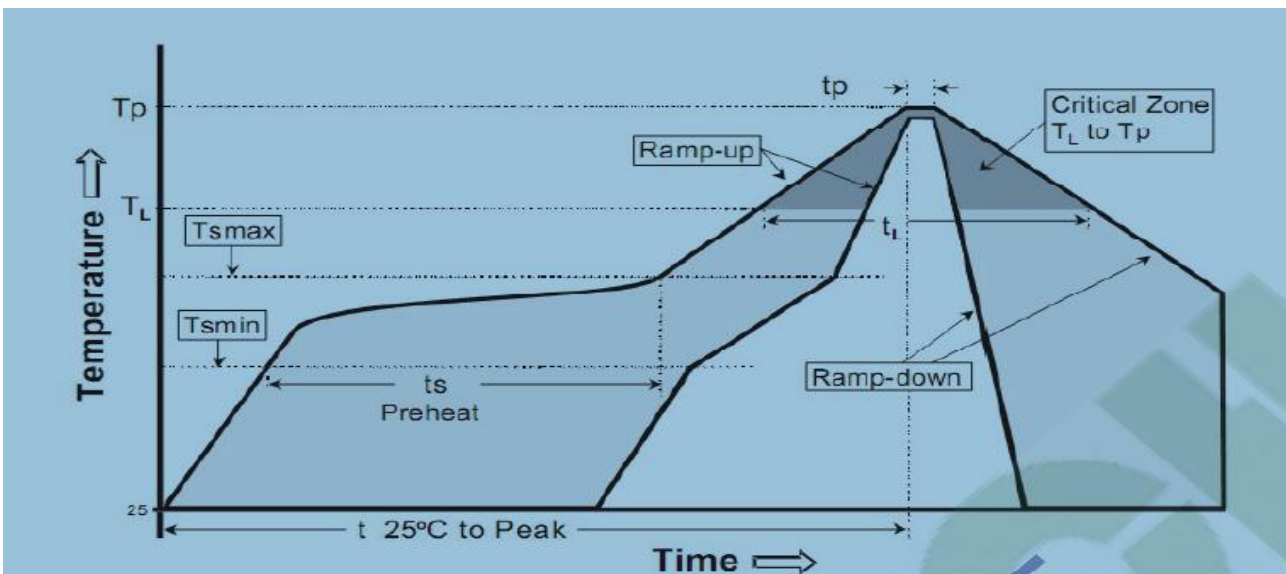
Classification Reflow Profile		
Profile Feature	Pb-Free Assembly	
	Large Body	Small Body
Preheat	150°C	
-Temperature Min(Ts min)	200°C	
-Temperature Max(Ts max)	60 -180 seconds	
-Time(min to max) (ts)	3°C/second max	
Tsmax to TL	217°C	
-Ramp-up Rate	60-150 seconds	
Time maintained above:		
-Temperature(TL)		
-Time(TL)		



Peak Temperature(Tp)	245+0/-5°C	250+0/-5°C
Time within 5°C of actual Peak Temperature(Tp)	10-30 seconds	10-30 seconds
Ramp-down Rate	6°C/second max.	
Time 25°C to Peak Temperature	8 minutes max.	

Note: 1.All temperatures refer to topside of the package,measured on the package bodysurface.

2.The baking is required, devices may be baked for 2hr at 120°C +0/-5°C



10.4: Stored Item:

10.4.1.Calculate shelf life in sealed bag:12 months at<40°C and <90%RH.

10.4.2. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must:

- a).Mounted within :72hours of factory condition<25°C/60%RH
- b). Stored to N2 BOX



11. Packing Specification

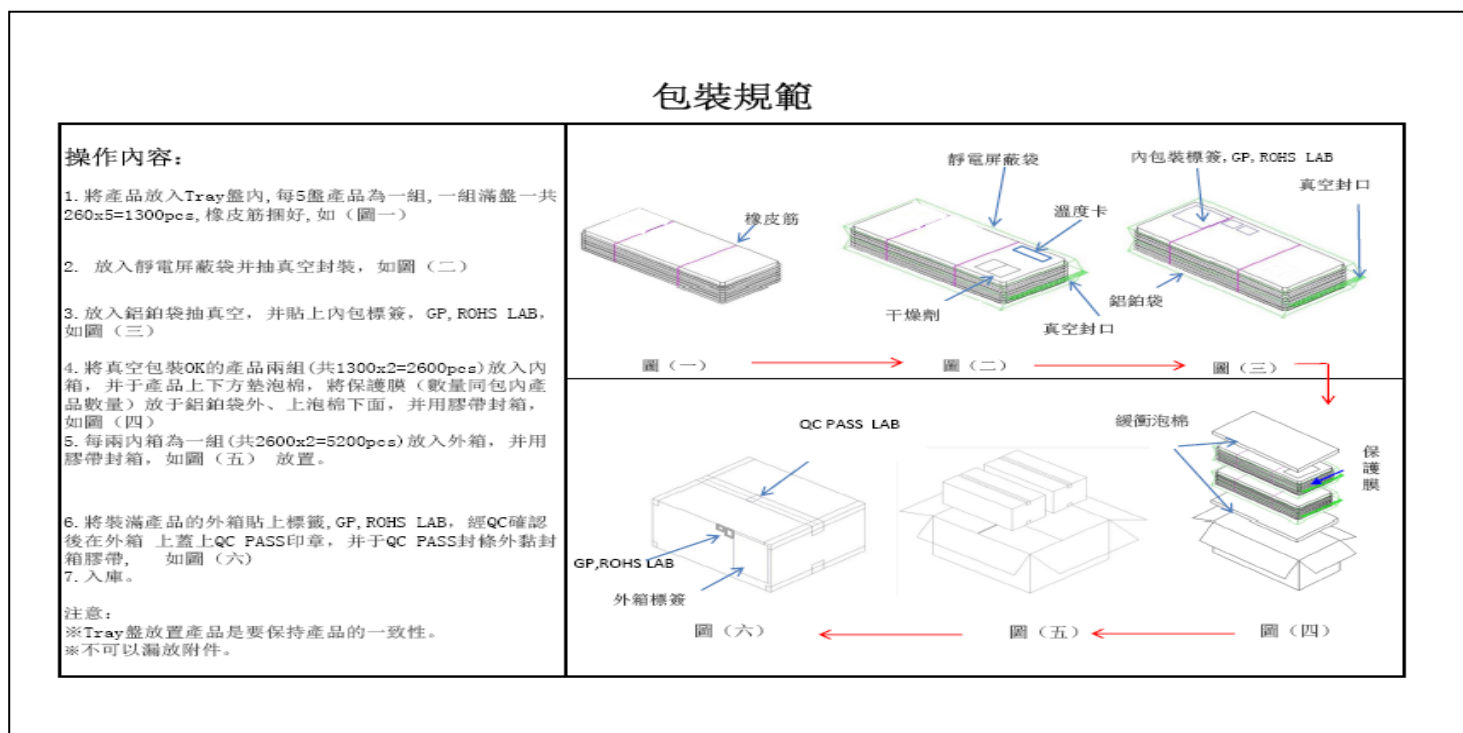
All the finished goods are placed in anti-static tray and bag packaged in box to withstand shock. The detail packing drawing is shown in Appendix 1.

12. Reference

- OV13850_COB_DS_V1.2 Data Sheet
- MIL-STD-883E 1004.7 : Moisture Resistance
- IEC 60068-2-1 : Test Ab Cold
- IEC 60068-2-2: Test Bb Dry Heat
- IEC 60068-2-14: Test Na Change of Temperature
- IPC/JEDEC J-STD-033

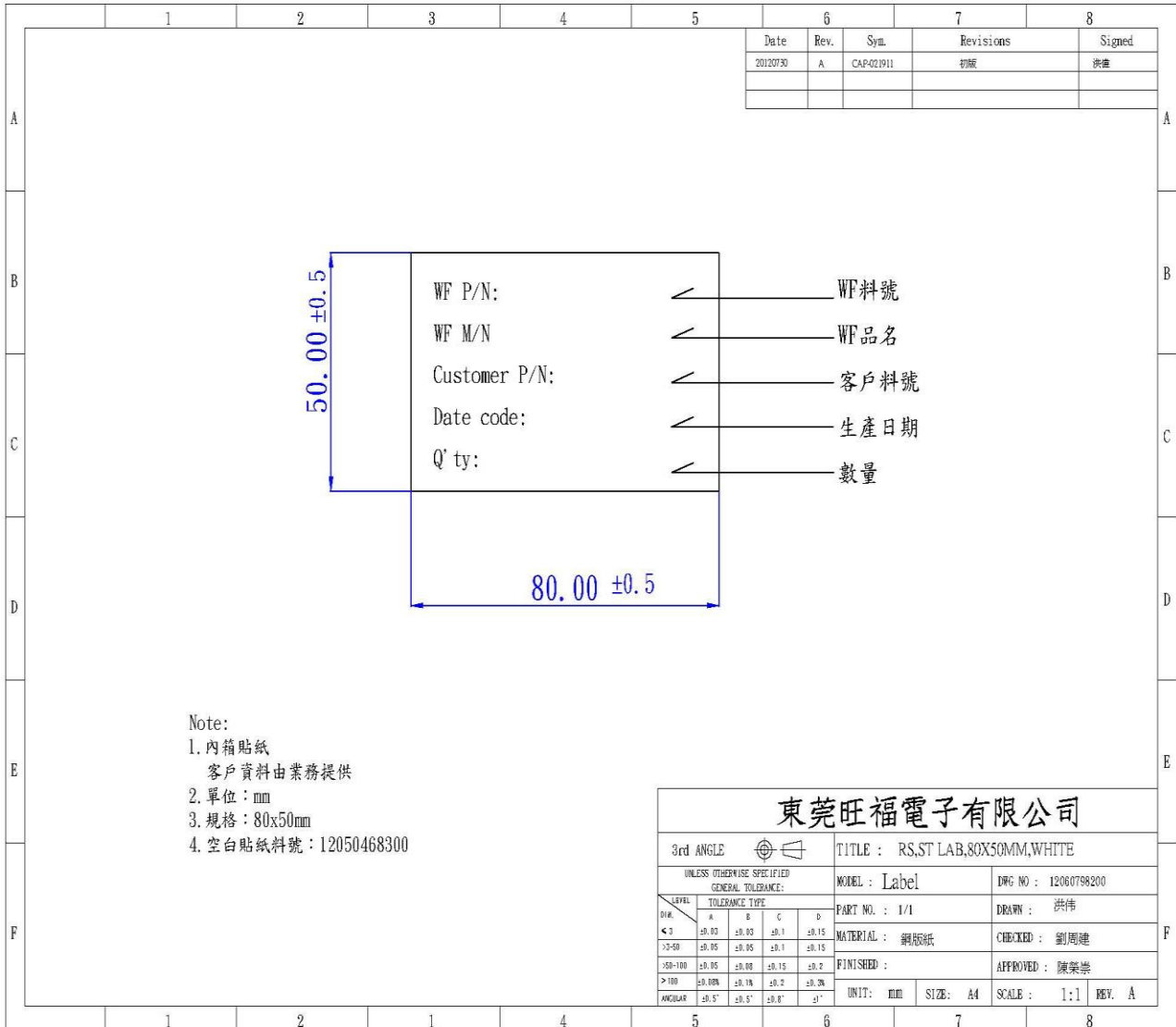
13. Appendix

13.1: Packing drawing.



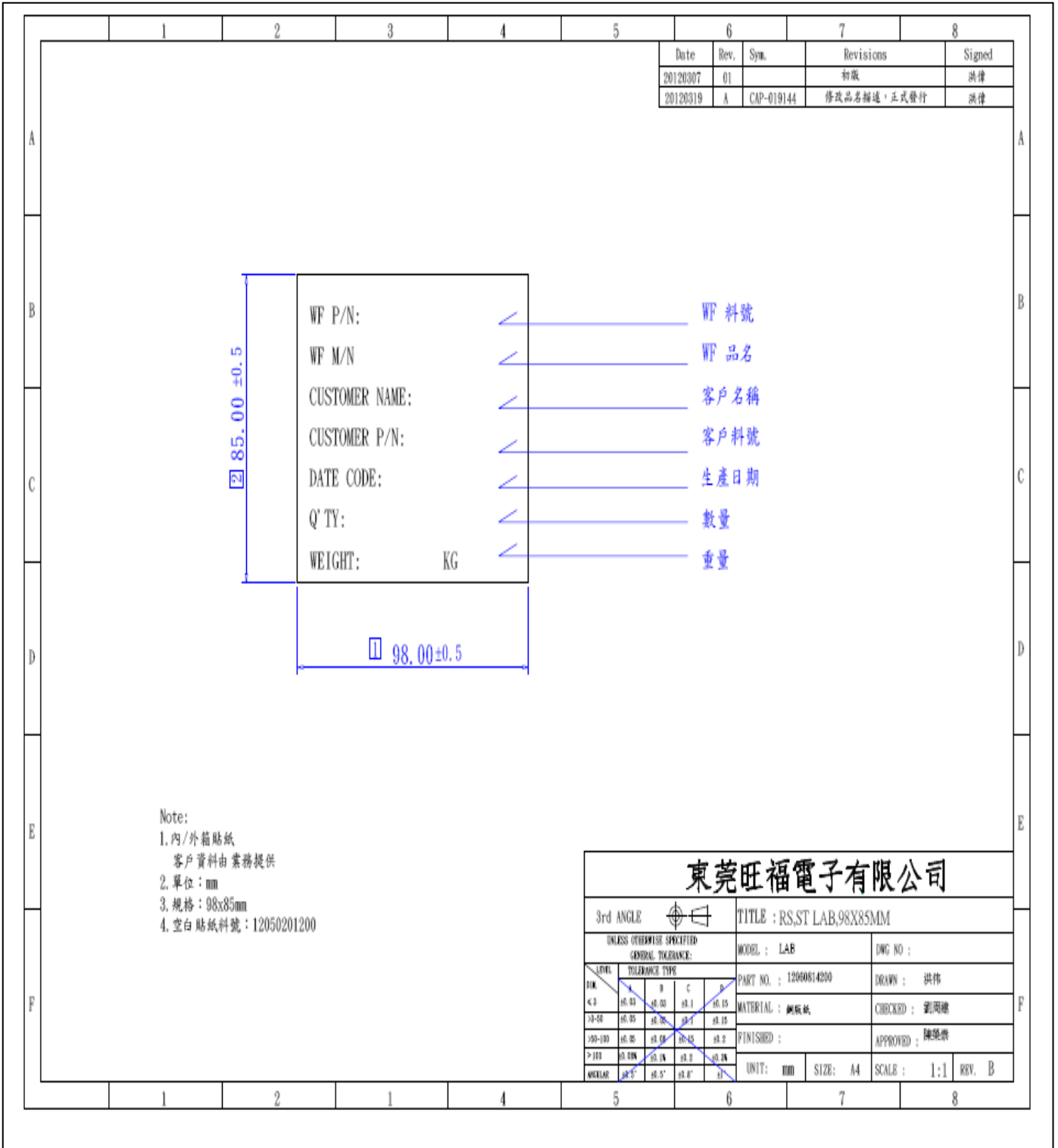


13.2 Inner Box Lable





13.3 External Box Label



Sales: Shenzhen Sunnywale Inc, www.sunnywale.com , awin@sunnywale.com , Wechat: 9308762