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# **Product Target Specification**

5647

Version: V 1.0.1

Camera Module Division

Date: July. 6th , 2012

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## Changes of Each Revision

Date	Rev.	Changes
2012/07/06	V1.0.1	Add P/N
2012/06/27	V1.0.0	New release

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## 1. General Description

The camera module (5647) is low voltage image sensor camera and lens module designed for mobile application with low power consumption and small size is of utmost importance. The device can be programmed to provide image output in various fully processed and automatic image functions.

## 2. Key Specification

Module Specification	
Size (LWH/mm)	8.5±0.2 ×18.75±0.2 × 5.1±0.2 mm
FPC Thickness	0.12 mm
Image sensor	1/4" OV5647 sensor
Active array Size	2592X1944
Output format (8-bit)	8-10 bit RGB RAW output
Maximum Image Transfer Rate	15fps at QSXGA 30fps at 1080P 45fps at 960p 60fps at 720p 90fps at VGA 120fps at QVGA

Power Supply & Requirement					
		Min.	Typ.	Max.	Unit
Analog (AVDD)		2.6	2.8	3	V
Core (DVDD)		1.425	1.5	1.575	V
I/O(DOVDD)		1.7	1.8	3	V
Active mode 2592x1944@15fps	IDD_A	--	31	45	mA
	IDD_DO	--	65	78	mA
Standby mode	IDDS_SCCB	--	20	50	uA
	IDDS_PWDN	--	20	50	uA

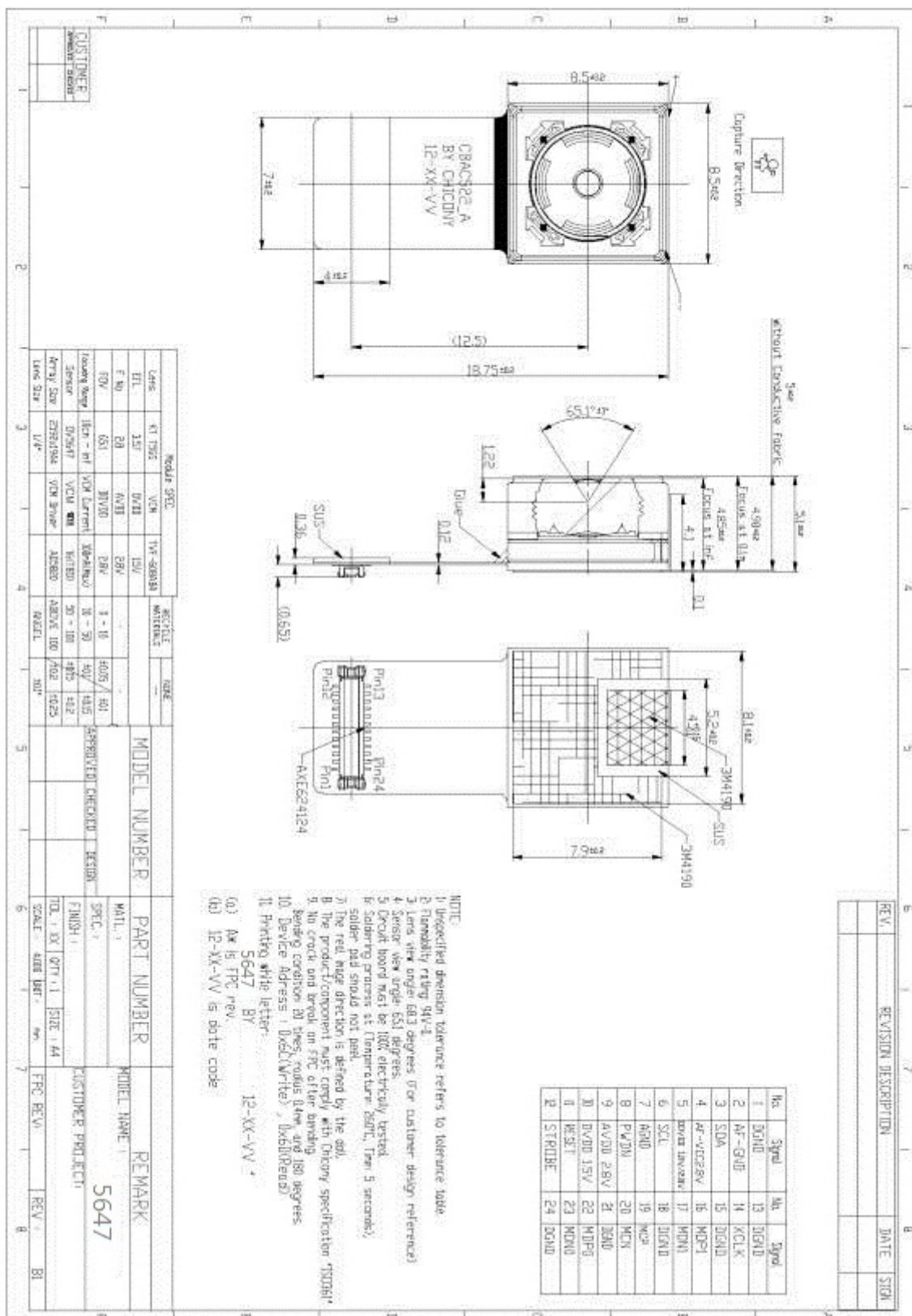
Remark : The above power consumption is complete based on sensor spec

Lens Major Specification	
Element	4P
FNO	2.8
Field of View (Diagonal)	65.1
Distortion	-.37%
Focus Range	10cm~inf

### 3.Pin Assignment

Pin description			
Pin number	Name	Type	Function
1	DGND	G	Digital GND
2	AF-GND	G	AFIC GND
3	SDA	I/O	SCCB data
4	AF-VCC	P	VCM power 2.8V
5	DOVDD	P	IO VDD 1.8V/2.8V
6	SCL	I	SCCB clock
7	AGND	G	Analog GND
8	PWDN	I	sensor power down
9	AVDD	P	Analog VDD 2.8V
10	DVDD	P	core VDD 1.5V
11	RESET	I	sensor reset
12	STROBE	I/O	Strobe
13	DGND	G	Digital GND
14	XCLK	I	system input clock
15	DGND	G	Digital GND
16	MDP1	I/O	MIPI data lane1 positive output
17	MDN1	I/O	MIPI data lane1 negative output
18	DGND	G	Digital GND
19	MCP	I/O	MIPI clock positive output
20	MCN	I/O	MIPI clock negative output
21	DGND	G	Digital GND
22	MDP0	I/O	MIPI data lane0 positive output
23	MDN0	I/O	MIPI data lane0 negative output
24	DGND	G	Digital GND

## 4. Reference Drawing



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## 5. Quality Specification

### 5.1 Environmental & Reliability

	Item	Specification	Test Methods & Conditions
1.	Packing Storage	-40°C ~ 80°C ( Humidity 80% )	
2	Non Packing Storage	25°C ~ 30°C ( Humidity 60% )	
3	Operating Temperature ( Installed in the Application side )	-10°C ~ 55°C ( Humidity 50% )	Only guarantee function OK.
4	Packing Vibration	1. 10 ~ 60 Hz, 0.06 inches. 2. 60 minutes for X, Y and Z axis.	
5	Packing drop	Drop height : 150cm. Ground : Steel metal. 1 time per face, edge and corner. For 1 corner, 3 edges and 6 faces.	
6	Bare Drop	Drop height : 150cm. Ground : Steel metal. 2 time per face, 6 faces.	Specimen must be set on a dummy set of 100g
7	Connect Insertion	Force <= 0.7 Kg	
8	FPC Bending	Radius 0.4mm 180 degrees. Times: 10 times	

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## 5.2 Defect Pixel Specification

Table 1. Defect specification with Defect Correction ON.

Defect Type(s)	Tolerance Specifications with Defect pixel Correction"ON"
Defect Pixel(s)	0
Cluster(s)	0
Dead row(s)	0
Dead column(s)	0

### 5.2.1 Test Criteria and Conditions:

- ( 1 ) Guarantee Temperature :  $25 \pm 3^{\circ}\text{C}$ . ( only camera module )
- ( 2 ) Color temperature:  $6500\text{K} \pm 5\%$
- ( 3 ) Dark mode register setting: Auto Off (AGC/AWB/AEC OFF) / 7.5 fps/ 1x Digital gain / Defect Pixel Correction enabled.
- ( 4 ) Bright mode register setting: Auto Off (AGC/AWB/AEC OFF) / 15 fps/ 1x Analog gain / 1x Digital gain / Defect Pixel Correction enabled.
- ( 5 ) Dark defect (bright mode):
  - A. Image luminance level is between 100 ~ 180 DN.
  - B. Dark/ White defect pixel is 40% higher/ lower than the normal mean pixel in the same color channel.
- ( 6 ) Bright defect (dark mode):
  - A. Whole image luminance level is below 10DN.
  - B. Bright defect pixel is any 1x1 pixel with pixel value > 50 DN higher than normal mean pixels.
- ( 7 ) These criteria are not for visual test with demo kit.

### 5.2.2 Defect Pixel Definitions :

- ( 1 ) Normal mean pixel is defined as 32 pixels x 32 pixels block including the defect pixel.
- ( 2 ) Defect pixels include black and bright or color pixels.
- ( 3 ) Dark defect pixels at light mode are 40% lower than the normal mean pixel are labeled dead pixels (8-bit) in the same color channel.
- ( 4 ) White defect pixels at light mode are 40% higher than the normal mean pixel are labeled dead pixels (8-bit) in the same color channel.



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- ( 5 ) Bright defect pixel at dark mode is any 1x1 pixel with a value  $> 50\text{DN}$  higher than normal mean pixels (8-bit).
- ( 6 ) A dead cluster is defined as a collection of dead pixels that are  $\geq 1 \times 2$  pixel size in the same color panel.

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## 5.3 Particle Specification

### 5.3.1 Test Conditions :

A. Test Chart: White Card

檢測圖：白卡

B. Distance (Between the camera module and Testing Chart): 5-10 cm

檢測距離(產品至檢測圖)：5-10 公分

C. Color Temperature: 6500°K

色溫：6500°K

D. luminance : 400 Lux

照度：400 Lux

E. Zone definition : Reference table 2.

### 5.3.2 Procedure & Criterion (檢測流程與結果判定)

#### (1) Procedure (檢測流程)

A. Attach an under testing camera module to PC. Align the lens toward Testing Chart.

將待測攝像模組連接上電腦並對準檢測圖。

B. Activate the Testing Tool, and then inspect the image in the screen.

開啟檢測程式進行檢測。

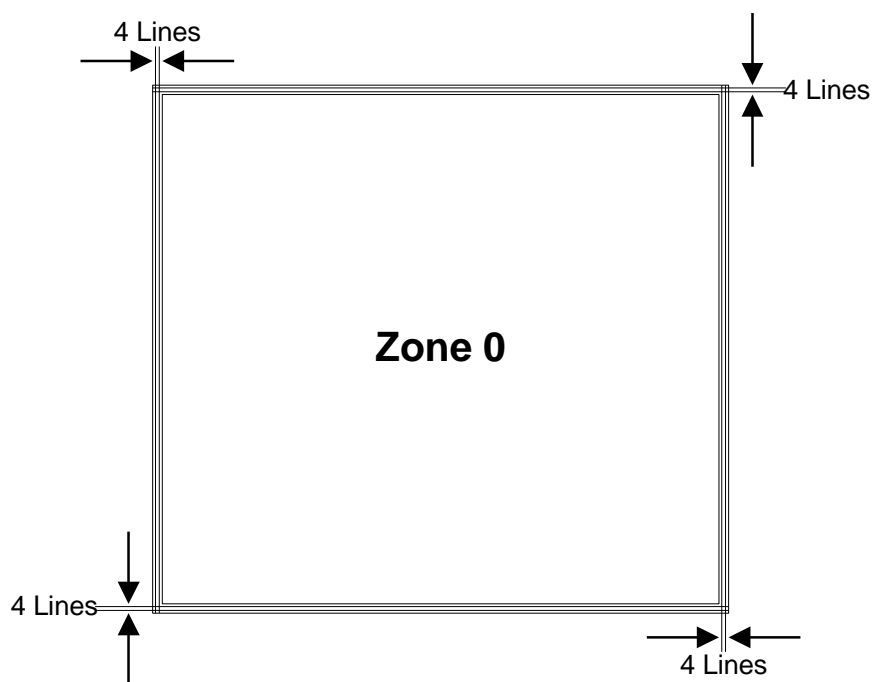
C. Particle is 50% higher/ lower in luminance than the normal mean pixels.

(2) Criterion (結果判定)

We will be judged according to the below table.

Particle Pixel Size	Zone 0 / Q'ty	Remark
1 * 1	N/A 不計	
2 * 2	3	
3 * 3		
4 * 4		
5 * 5	0	
6 * 6	0	
7 * 7	0	

Table 2 : Zone definition Guaranteed Zone: Zone 0 at Max image resolution,  
The 4 lines on the edge are not included.



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## 5.4 Blemish spec

### 5.4.1 Test Conditions :

A. Test Chart: White Card

檢測圖：白卡

B. Distance (Between the camera module and Testing Chart): 5-10 cm

檢測距離(產品至檢測圖)：10-15 公分

C. Color Temperature: 6500°K

色溫：6500°K

D. luminance : 200 Lux

照度：200 Lux

E. Zone definition : Reference table 2.

### 5.4.2 Procedure & Criterion (檢測流程與結果判定)

(1) Procedure (檢測流程)

A. Attach an under testing camera module to PC. Align the lens toward Testing Chart.

將待測攝像模組連接上電腦並對準檢測圖。

B. Activate the Testing Tool, and then inspect the image in the screen.

開啟檢測程式進行目視檢測。

(2) Criterion (結果判定)

A. Definition for Guaranteed Zone and Small/Large Cluster in the image (區域及叢點定義)

(I). Guaranteed Zone: Zone 0 at Max image resolution, please see Figure 2. The 4 lines on the edge are not included.

保證區域：影像最高解析度，Zone 0，不含邊緣內四線之區域，請見圖 2。

(II). Blemish Cluster: Group of Pixels. The size of whole group shall be larger than 15x15 Pixel.

Blemish Cluster：大於 15x15 pixels 的叢點

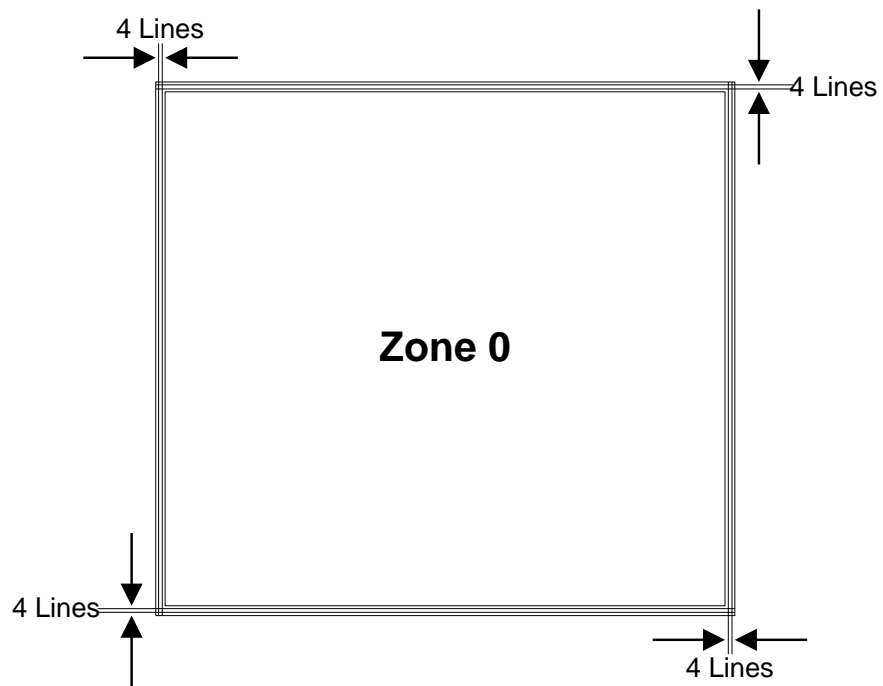


Figure 2 : Definition of Guaranteed Zone in the image (圖 2 : 保證區域定義)

Darkness level Pixels $\geq 15 \times 15$	Zone 0
-4~-6	2
- 7 以上	0



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## 5.5 Appearance

### 5.5.1 Procedure & Criterion (檢測流程與結果判定)

#### (1) Procedure (檢測流程)

A. Place an under testing camera module on the table under 20~40W fluorescent light source

將待測攝像模組平放在 20~40W 日光燈下。

B. Check this camera module appearance and use Vernier Caliper to measure critical dimension

使用游標卡尺量測及目視檢查產品外觀。

#### (2) Criterion (結果判定)

If there is any defective item listed in Table 3, the camera module shall be treated a disqualified one; otherwise, it shall be a qualified one.

產品如有表 3 內任一主要缺點(MAJ)，即判定為不合格品。反之，則為合格品。

A. Major defect: A camera module malfunctions or causes dedicated function failed due to this defect. Or customer can't apply the camera module to their system because of this defect.






主要缺點(MAJ)定義：該缺點會使產品之部分功能或特定功能不堪使用，或從而影響到產品的性能，造成客戶(系統整合者)無法將產品整合至客戶單機上。

B. Minor defect: The defect may not impact system integration on the customer machine, but it is the item which factory shall beware for quality improvement.

次要項目(MIN)定義：該缺點雖不造成客戶無法將產品整合至客戶單機上，但仍未達我們產品規格，需要後續持續改善。

Table 3 : The Criteria for Exterior Inspection (表 3：外觀檢驗標準)

序號	檢驗項目	判定標準		
		標準狀況	允收狀況	允收狀況
1	模組組件	 30cm 均勻光源目視無變形、開口	 允許有目視不易辨別且不影響功能的開口	 不允許有目視可辨的變形及開口。
2	鏡頭端面	 鏡頭端中心 1/2 面應完整，無任何損傷劃痕、無沾膠/污染、無泛白等現象	 30cm 均勻光源目視：鏡頭中心 1/2 端面，允許有小於 $0.2\text{mm}^2$ 的缺陷 缺陷包括：油污、變色、汙點、劃痕、壓痕、毛刺等	 30cm 均勻光源目視：鏡頭中心 1/2 端面，不允許有大於 $0.2\text{mm}^2$ 的缺陷 缺陷包括：油污、變色、汙點、劃痕、壓痕、毛刺等
3	鏡頭鏡片	 01 片表面應乾淨 無污染、無雜物/沾膠、無劃痕、損傷等現象	 30cm 均勻光源目視：鏡頭中心 1/2 端面，允許有小於 $0.03\text{mm}^2$ 的缺陷 缺陷包括：油污、變色、汙點、劃痕、壓痕、毛刺等	 30cm 均勻光源目視：鏡頭中心 1/2 端面，不允許有大於 $0.03\text{mm}^2$ 的缺陷 缺陷包括：油污、變色、汙點、劃痕、壓痕、毛刺等
4	成像方向	 圖像成像方向與圖紙規格書要求保持一致。		不允許出現成像方向與規格書相反 90 度180 度的現象。
5	保護膜位置	 保護膜按照規格要求的位元置正確粘貼，保護膜無破損 脫落 偏位 漏貼現象。	 允許保護膜在鏡頭鏡片及鏡頭端面正常粘附前提下有輕微偏移。	 不允許保護膜未完全覆蓋住鏡頭或 01 片，有漏貼、偏移量大於 45 度現象。

6	背膠泡棉位置			
		客戶有背膠、泡棉要求的，則在相應位置加貼符合電子圖檔要求。	允許導電泡棉位置在不超過加強板的情況下有輕微偏移現象。	不允許背膠三邊位置超過加強板，影響整體頭部尺寸。
7	包銅(鋁)箔			
		包銅(鋁)箔後總尺寸在公差範圍內、無破損、變形、折痕、氧化等不良現象。		不允許銅(鋁)箔有破損超過 $1\text{mm}^2$ 、氧化、尺寸超標等不良。

序號	項目	檢驗方法及工具	缺陷描述	缺陷類型
1	外形尺寸	卡尺和實裝	外形尺寸超出規格書要求，且影響攝像頭實際裝配的	MA
			外形尺寸超出規格書要求，不影響攝像頭實際裝配的	MI
2	外觀檢查	目視 比對菲林	模組分裂，參照本章第 5 條第 1 點要求	MA
			鏡頭端面（非鏡片）劃傷、粘膠、髒汙、溢膠，參照本章第 5 條第 2 點要求	MI
			鏡頭鏡片油污、變色、污點、劃痕、壓痕、毛刺等，參照本章第 5 條第 3 點要求	MA
			FPC 金手指氧化、髒汙	MA
			FPC 皺褶、劃傷、壓痕、氣泡	MI
			FPC 撕裂、破損、暈圈、缺口、分層	MA
			絲印殘缺、模糊不清	MI
			Housing 底部溢膠，影響裝配	MI
			背膠、泡棉膠漏貼、錯位，參照本章第 5 條第 9 點要求	MI
			包銅不良，參照本章第 5 條第 10 點要求	MI
			保護膜漏貼、連焊、脫落、脫膠，貼偏，參照第 5 條第 8 點要求	MI
			連接器虛焊、破損、變形	MA
			元器件漏貼、脫落	MA



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## 5.6 Other Description

If the application side of the module output image to SW, FW, HW re-produced or adjust the image may result in abnormal phenomenon to avoid the disputes, if application side have any image NG , factory will use test fixture as the main diagnostic tools , when factory test fixture test is OK , factory will not be any long term improvement solution and action.

若客戶應用端的 SW、FW、HW 對於 Module 輸出的影像進行再製或調整，將有可能造成影像異常的現象，為避免雙方爭議，對於客戶應用端所發現的影像不良，工廠將測試治具為做為主要的覆判工具，當工廠測試治具測試覆判為OK時，工廠將不會提出任何長短期的改善對策。