

Kingpak Compact Camera Module Specification

KM-U30MS-TP03

TPLCC 10x10x1.5mm 36L

2 MegaPixel 1/3-inch SOC

Preliminary Data Sheet

Nov.03.2009

(Revision 0.0)

Document Revision History

Revision	Date	Description	Released
0.0	11/03/2009	-Refer to KM-U30MS-TP02, modified mechanical drawing (HD0025B).	M.N.Ho

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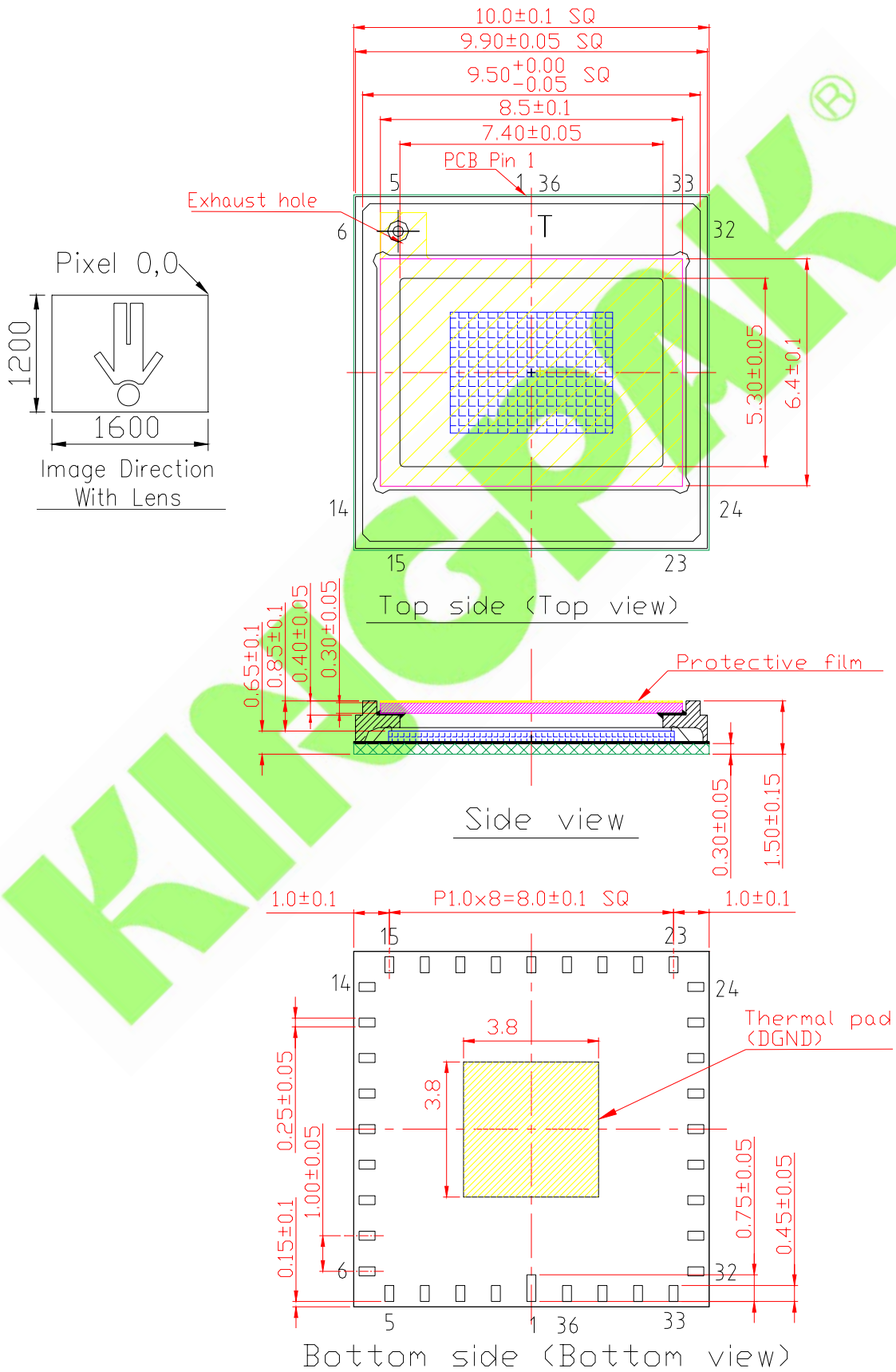
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1. Introduction

Kingpak Technology Inc. provides an innovative packaging technology for such key components in camera cell phones. This technology is packaged using Chip On Board (COB) process inside the class 10 clean room. This process works under meticulous quality control conditions, which help to produce images of the highest quality in camera cell phones and other products.

The KM-U30MS-TP03 is a highly integrated UXGA camera module which includes CMOS image sensor (CIS) and Image Signal Processor (ISP) with a real-time JPEG encoder on chip with cover glass (or IR filter) and housing packed compact size 10.0x10.0x1.5mm single package. The sensor is fabricated by 0.18 μ m CMOS process technology developed for imaging application to realize high-efficiency and low-power photo sensor. The sensor consists of 1600H x 1200V effective pixels which meet with 1/3 inch optical format. The CIS has on-chip 10-bit ADC arrays to digitize the pixel output and also on-chip Correlated Double Sampling (CDS) to reduce Fixed Pattern Noise (FPN) drastically. The ISP performs sophisticated image processing functions including color recovery and correction, lens shading correction, edge enhancement, programmable gamma correction, image scaling, auto exposure (AE), auto white balance (AWB), auto flicker correction, auto defect correction, and auto black reference clamping. The AE and AWB functions are performed by an embedded RISC processor. The programmable functions are controlled by host processor via 2-wire I2C bus interface. The KM-U30MS-TP03, which needs a single master clock, is suitable for low power camera module with 2.8V/1.8V power supply.

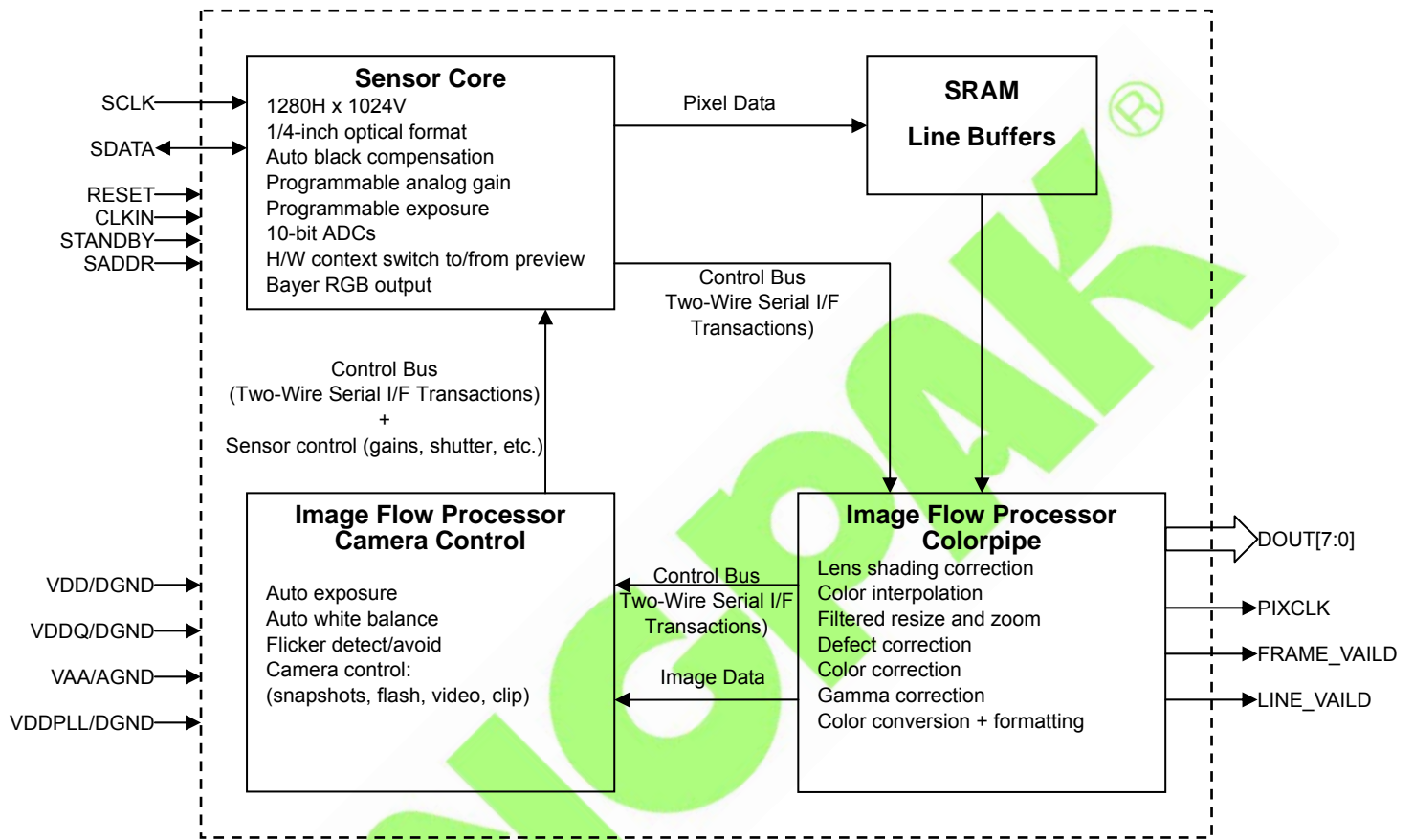
2. Mechanical Specifications (unit : mm)



3. Performance Parameter and Features

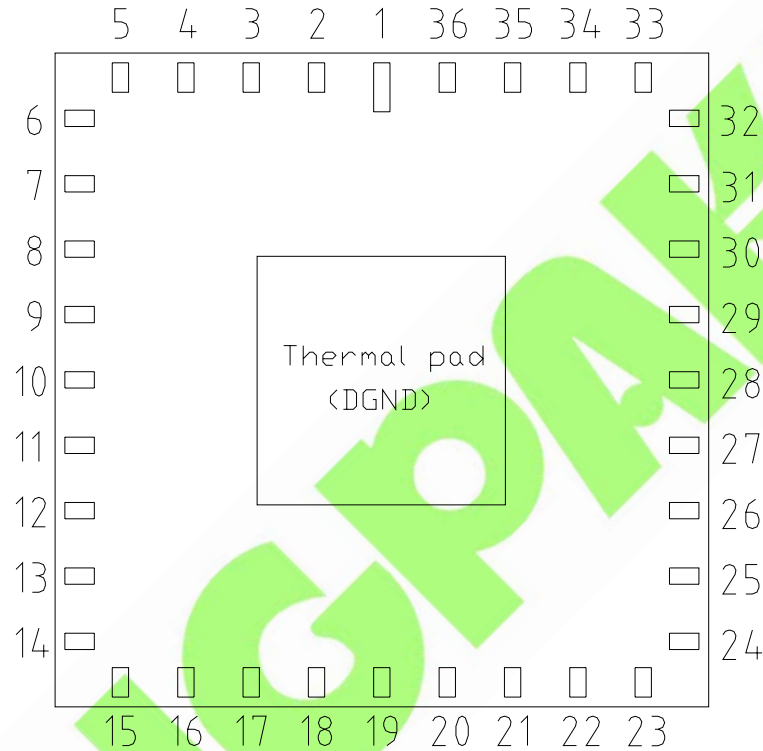
Parameter		Typical value
Optical format		1/3-inch(4:3)
Active image size		4.73mm(H)x3.52mm(V),5.60mm(diagonal)
Active pixels		1600H x 1200V
Pixel size		2.8um x 2.8um
Color filter array		RGB bayer pattern
Shutter type		Electronic rolling shutter(ERS)
Maximum data rate/master clock		80MBPS/80MHz
Output Format		JPEG 4:2:2 and 4:2:0, 8bit ITU-R.601(4:2:2 YCbCr), 565RGB, 555RGB, 444RGB, and Raw output data
Frame rate	UXGA(1600 x 1200)	15 fps
	Preview (800 x 600)	30 fps
ADC resolution		10-bit
Responsivity		1.0V/lux-sec(550nm)
Dynamic range		71dB
SNRmax		42.3dB
Supply voltage	I/O digital	1.7V-3.1V
	Core digital	1.7V-1.95V
	PLL	2.5V-3.1V
	Analog	2.5V-3.1V
Power consumption		346mW at Context B, 1600x1200, JPEG on 222mW at Context A, 800x600, No JPEG
Module	Process	Chip On Board (COB)
	Size	10x10x1.5mm
	Pin count	36 pins
Cover glass or IR filter(option)		Cover glass : thickness=0.3mm IR filter : 650+/-10nm at T=50%, Thickness=0.3mm
Housing material		LCP + 30% GF (Black)
Operating temperature		-30℃ ~ +70℃
Storage Temperature		-40℃ ~ +85℃
Features		On-die phase lock loop (PLL)/ Real-time JPEG encoder Auto Exposure (AE)/Auto White Balance (AWB)/Auto Flicker Avoidance Auto Defect Identification and Correction Auto Black Reference Clamping I2C Bus Control Interface

4. Functional Block Diagram



5. Signal Description

5.1 Pin Assignment (Top View)



5.2 Pin Signal Description

Pin No	Pin Name	Type	Description
1	SDATA	I/O	Two-Wire Serial Interface Data
2	PIXCLK	Output	Pixel Clock – to be used for sampling DOUT, FRAME_VALID, and LINE_VALID
3	LINE_VALID	Output	Identifies Lines in the Active Image
4	FRAME_VALID	Output	Identifies Rows in the Active Image
5	VDD	Supply	Core Digital Power (1.8V)
6	DGND	Supply	Digital & I/O & PLL Ground
7	DOUT0	Output	Pixel Data Output[0]
8	DOUT1	Output	Pixel Data Output[1]
9	DOUT2	Output	Pixel Data Output[2]
10	DOUT3	Output	Pixel Data Output[3]
11	VDDQ	Supply	I/O Power
12	DGND	Supply	Digital & I/O & PLL Ground
13	DOUT4	Output	Pixel Data Output[4]
14	DOUT5	Output	Pixel Data Output[5]

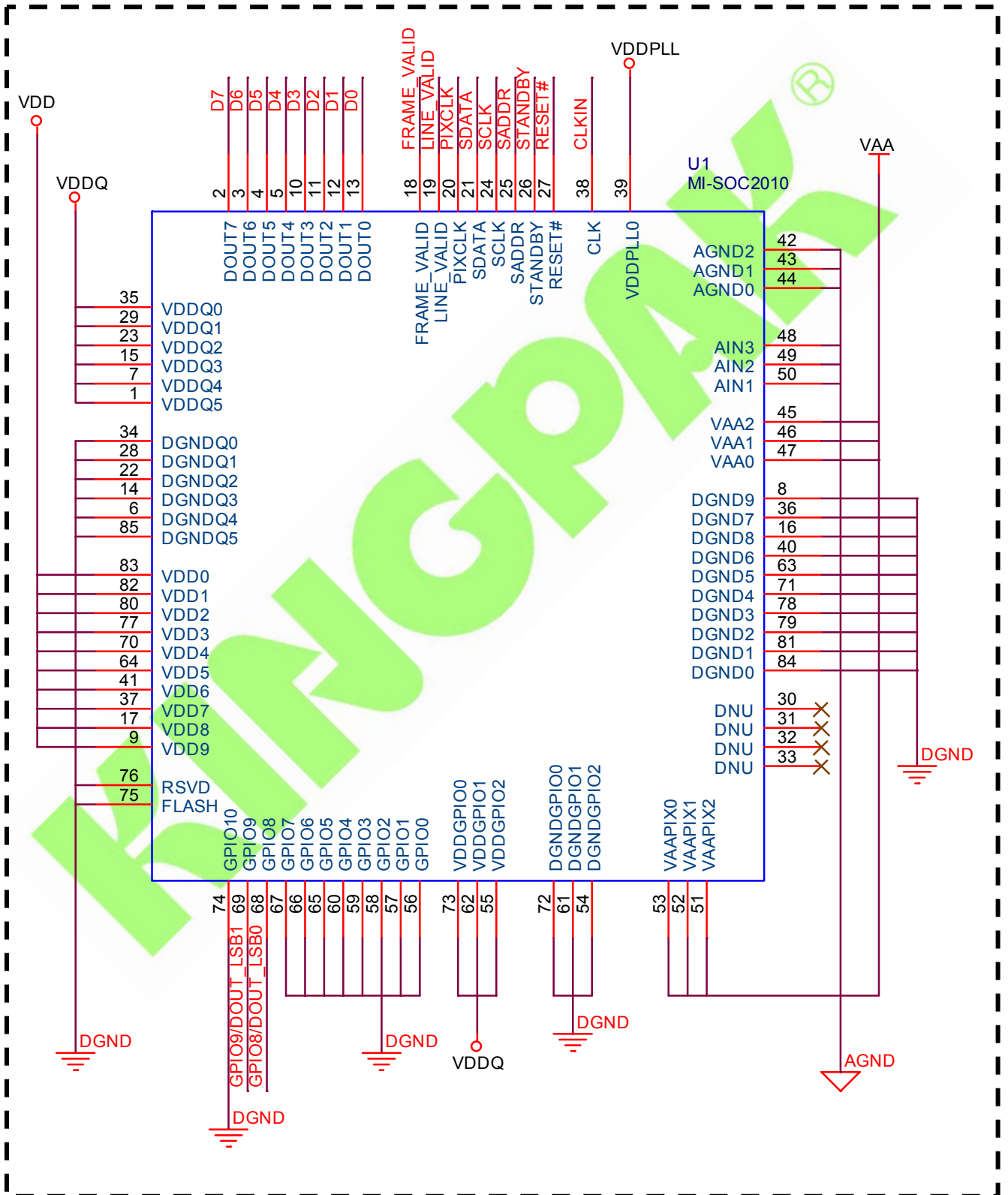
15	DOUT6	Output	Pixel Data Output[6]
16	DOUT7	Output	Pixel Data Output[7]
17	DGND	Supply	Digital & I/O & PLL Ground
18	DOUT_LSB0/ GPIO8	I/O	GPIO8 during normal IFP operation or data bit 0 in 10-bit sensor bypass mode.
19	DOUT_LSB1/ GPIO9	I/O	GPIO9 during normal IFP operation or data bit 1 in 10-bit sensor bypass mode.
20	VDD	Supply	Core Digital Power (1.8V)
21	VDDQ	Supply	I/O Power
22	VAA	Supply	Analog Power (2.8V)
23	VAA	Supply	Analog Power (2.8V)
24	AGND	Supply	Analog Ground
25	VDD	Supply	Core Digital Power (1.8V)
26	VDDQ	Supply	I/O Power
27	DGND	Supply	Digital & I/O & PLL Ground
28	VDDPLL	Supply	PLL Power
29	CLKIN	Input	Sensor Master Clock (can either drive the on-chip PLL or bypass it)
30	VDD	Supply	Core Digital Power (1.8V)
31	DGND	Supply	Digital & I/O & PLL Ground
32	VDDQ	Supply	I/O Power
33	RESET#	Input	Master Reset Signal, Active LOW
34	STANDBY	Input	Controls Sensor's Standby Mode
35	SADDR	Input	Selects Device Address for the Two-Wire Serial Interface. The address is 0x90 when SADDR is tied LOW, 0xBA if tied HIGH. See also R0x0D:0[10]
36	SCLK	Input	Two-Wire Serial Interface Clock.

6. Electrical Characteristics

Parameter	Condition	Min	Typ	Max	Unit
I/O digital voltage (VDDQ)		1.7	2.8	3.1	V
Core digital voltage (VDD)		1.7	1.8	1.95	
PLL analog voltage (VDDPLL)		2.5	2.8	3.1	
Pixel supply voltage (VAAPIX)		2.5	2.8	3.1	
Analog voltage (VAA)		2.5	2.8	3.1	
Standby current	MCLK=0Hz		35	100	μA
IDDQ1	Context B, 1600x1200, JPEG on, CLKIN=Max, PIXCLK=Max		15		mA
IDD1	Context B, 1600x1200, JPEG on, CLKIN=Max, PIXCLK=Max		92	100	
IAA1	Context B, 1600x1200, JPEG on, CLKIN=Max, PIXCLK=Max		43	55	
IAAPIX1	Context B, 1600x1200, JPEG on, CLKIN=Max, PIXCLK=Max		4	5.5	
IDDPLL1	Context B, 1600x1200, JPEG on, CLKIN=Max, PIXCLK=Max		2.3	3	
IDDQ2	Context A, 800x600, no JPEG, CLKIN=Max, PIXCLK=Max		15		mA
IDD2	Context A, 800x600, no JPEG, CLKIN=Max, PIXCLK=Max		48	60	
IAA2	Context A, 800x600, no JPEG, CLKIN=Max, PIXCLK=Max		27	35	
IAAPIX2	Context A, 800x600, no JPEG, CLKIN=Max, PIXCLK=Max		4	5.5	
IDDPLL2	Context A, 800x600, no JPEG, CLKIN=Max, PIXCLK=Max		2.3	3	
Power consumption	Context A, VDDQ=2.8V		222	233	mW
	Context B, VDDQ=2.8V		346	454	
Operating Temperature		-30		+70	°C
Storage Temperature		-40		+85	
Output high voltage(V _{OH})	VDDQ=1.8V / 2.8V	VDDQ-0.4		VDDQ	V

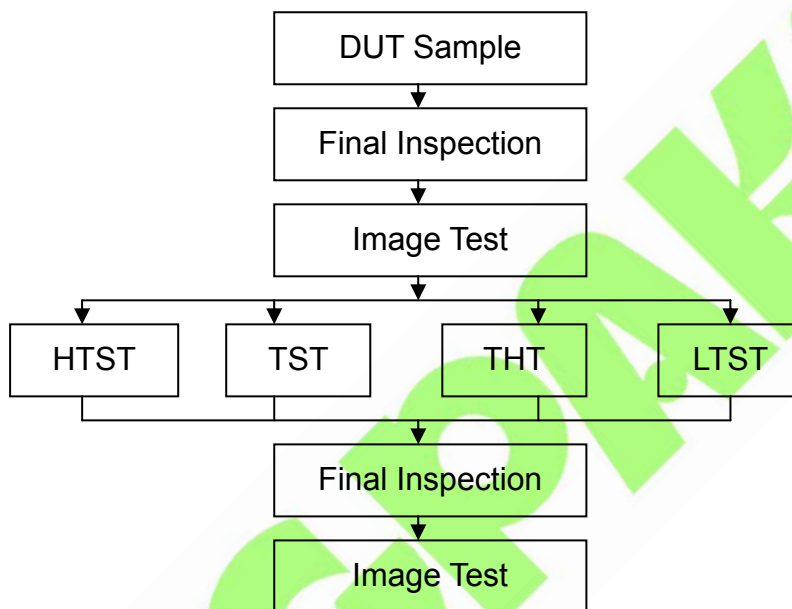
Output low voltage (V_{OL})				0.4	V
Output high current (I_{OH})	$V_{OH}=VDDQ\sim 400mV$, $VDDQ=1.7V$	-7			mA
Output low current (I_{OL})	$V_{OL}=VDDQ\sim 400mV$, $VDDQ=1.7V$	7			mA
Input high voltage (V_{IH})	$VDDQ=1.8V$	1.4		$VDDQ+0.3$	V
	$VDDQ=2.8V$	2.4		$VDDQ+0.3$	
Input low voltage (V_{IL})	$VDDQ=1.8V$	GND-0.3		0.5	V
	$VDDQ=2.8V$	GND-0.3		0.8	
Input leakage current (I_{IN})	$VIN=VDDQ$ or DGND	-10		10	μA
Output tri-state leakage current (I_{OZ})	$VIN=VDDQ$ or DGND	-10		10	μA
Input capacitance (C_{in})			3.5		pF
Load capacitance (C_{in})			15	20	pF
Input clock Frequency	PLL enabled	6	10	64	MHz
	PLL disabled	6		80	

7. Internal Schematic



8. Reliability and Environmental Test Specifications

8.1 Test Flow



8.2 Test Item

No	Test Item	Spec.	Condition	Criteria
1	Low Temperature Storage Test	IEC 60068-2-1	Temp : -40°C Time : 48hrs	Image pass
2	Temperature Shock Test	IEC 60068-2-1 IEC 60068-2-2 IEC 60068-2-14	Temp : -20°C ~ +60°C Dwell : 45mins Frequency : 27cycles	Image pass
3	High Temperature Storage Test	IEC 60068-2-2	Temp : 85°C Time : 48hrs	Image pass
4	Temperature & Humidity Test	MIL-STD-883E 1004	Temp : +40°C Humidity : 95%RH Time : 120hrs	Image pass

9. 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.

10. Reference

- Micron MT9D111 Sensor Datasheet
- 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

11. Appendix

Appendix 1 : Packing drawing.

標籤 A
LABEL A

KINGPAK

DEVICE NO : _____
 P/N : _____
 PACKAGE TYPE : _____
 WAFER LOT NO : _____
 ASSY P/N : _____
 ASSY LOT NO : _____
 D/C : _____ WEIGHT : _____ Kg
 QTY : _____ REMARK : _____
 BOX : ____ OF ____

尾數箱 RoHS

SAMPLE

KINGPAK

DEVICE NO : ML-SOC 360
 P/N : KM-S40MS-TP
 PACKAGE TYPE : TPLCC, 8*8mm, 28L
 WAFER LOT NO : NA
 ASSY P/N : FPTTMC028XXXN
 ASSY LOT NO : 860033
 D/C : 0833 WEIGHT : 0.56 Kg
 QTY : 2000 REMARK : _____
 BOX : 1 OF 1

尾數箱 RoHS

請參閱流程卡填寫:
REFER TO TRAVEL CARD

DEVICE NO : 客戶品名 Customer device.
 P/N : 客戶料號 Customer Part Number.
 PACKAGE TYPE : 產品種類
 WAFER LOT NO : 晶圓批號
 ASSY P/N : 成品料號
 ASSY LOT NO : 生產批號前六碼 Lot number by first 6 digits.
 D/C : 週期碼 年年週週 Date Code YYWW.
 QTY : 數量 Quantity.

BOX : 第幾箱 OF 總箱數 Note Box Count OF Total box.

WEIGHT : 裝箱重量 (單位: 公斤)
 量測值需至小數第二位
 (The resolution can be precisely to second decimal)
 Packaged Weight (Unit: Kg)
 (Product Must be Weighed if Packaged.)

REMARK : 尾數箱紅色蓋印標示
 Stamp a Red Color Mark to Indicate The Partial Load Box.

Title: 標籤 A LABEL A	DWG. NO.: PC074	DCC Rev/Rev 02/C
SIZE: A4	SCALE: 1:1	

標籤 B LABEL B

Kingpak P/N: XXXXXXXXXXXXXXXX

Customer P/N: XXXXXXXXXXXXXXXX

Date Code: YYYYWW

Quantity: XXXXX

Vendor code: KPK-KPK

SAMPLE

Kingpak P/N: KM-S40MS-TP

Customer P/N: ALQU40MSP00

Date Code: 0833

Quantity: 2000

Vendor code: KPK-KPK

請參閱流程卡填寫:
REFER TO TRAVEL CARD

Kingpak P/N : 勝開品名 Kingpak device.

Customer P/N : 客戶料號 Customer part number.

Date code : 週期碼 年年週週 YYYYWW.

Quantity: 數量.

Vendor code: 供應商代號

Title 標籤 B	DWG. NO.:	DCC Rev/Rev
	PC074	02/C
SIZE: A4	SCALE: 1:1	