PRODUCT	:	CAMERA MODULE
MODEL NO.	:	CP8132-D130SF-E
SUPPLIER	:	TRULY SEMICONDUCTORS LTD.
DATE	:	December 17, 2008

CERT. No. 946535
ISO9001
TL9000

SPECIFICATION

Revision: 0.2

CP8132-D130SF-E

If there is no special request from customer, TRULY SEMICONDUCTORS Co., Ltd will not reserve the tooling of the product under the following conditions:
1.There is no response from customer in two years after TRULY SEMICONDUCTORS Co., Ltd submit the samples；
2.There is no order in two years after the latest mass production.
And correlated data (include quality record) will be reserved one year more after tooling was discarded.

TRULY SEMICONDUCTORS LTD: **CUSTOMER:**

Quality Assurance Department:_____
Approved by:

Technical Department:_____

Approved by:

REVISION RECORD

REV NO.	REV DATE	CONTENTS	REMARKS
0.1	2008-09-11	First release	
0.2	2008-12-17	1.Increase General Description Item 2.Change Appearance Specification,Key Information,Electrical Characteristics,Mechanical Drawing,QA Plan, Precautions For Using CCM Modules, Items	

CONTENTS

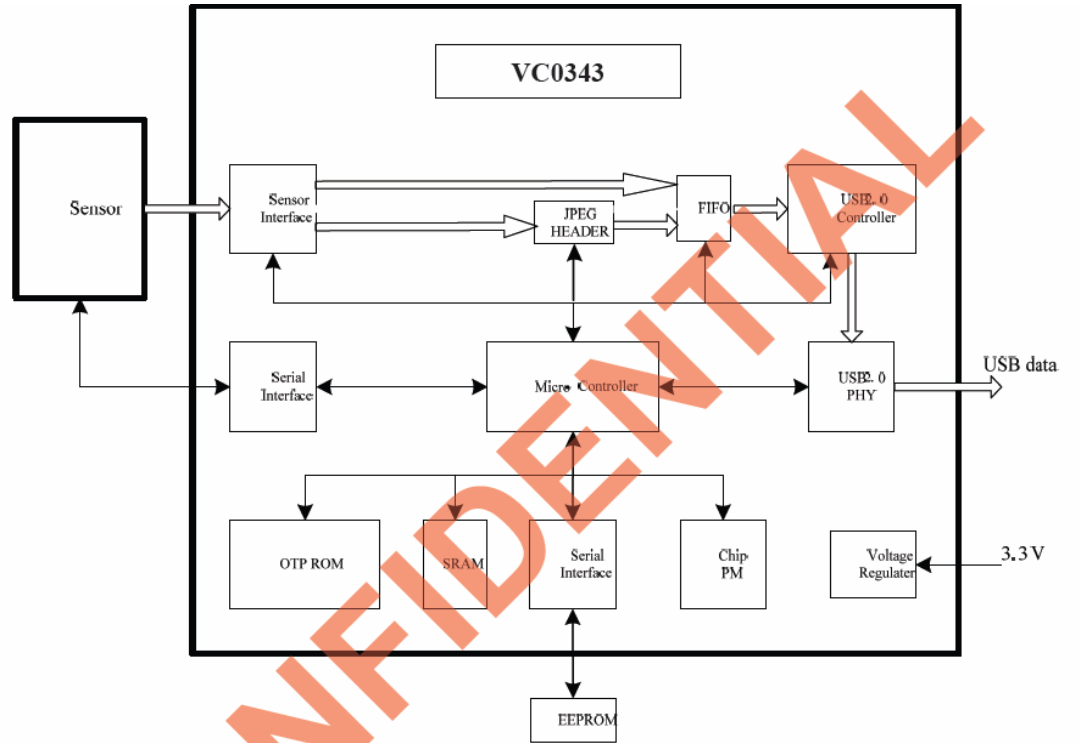
WRITTEN BY	CHECKED BY	APPROVED BY
HUANG WEI NA	WEI YOU XING	LIU TIE NAN

General Description

Truly's camera module for notebook 1.3MP is a 1.3 Mega-Pixel,USB 2.0 high-speed camera module designed to provide high quality colorful videos and still images,for instant visual communication applications on a notebook platform.The camera module is a sensor on board module designed for notebook application where low power consumption and small size are of utmost importance.It combines the CMOS sensor and platform for high quality camera products.

◆. VC0343TLNB Feature

VC0343TLNB is a low cost and small footprint USB 2.0 camera processor.VC0343 follows the USB 2.0 High-Speed/Full Speed protocol,fully compliant with USB Video Class 1.0 standards,USB Audio Class 1.0 standards,and Microsoft UAA standards.



The following tables show the main video operation modes that VC0343 supports:

USB Full Speed with Vimicro Driver

Maximum Frame Rate	QVGA	QQVGA
Uncompressed (Bayer raw 8-bit)	10fps	30fps
Uncompressed (Bayer raw 10-bit)	5fps	15fps
Uncompressed (YUY422)	-	15fps

USB High Speed with Vimicro Driver

Maximum Frame Rate	UXGA	SXGA	VGA	QVGA	QQVGA
Uncompressed (Bayer raw 8-bit)	10fps	15fps	30fps	30fps	30fps
Uncompressed (Bayer raw 10-bit)	5fps	7.5fps	30fps	30fps	30fps
Uncompressed (YUY422)	5fps	7.5fps	30fps	30fps	30fps
JPEG (4:2:2 or 4:2:0)	15fps	-	-	-	-

If no Vimicro driver is installed, only one kind of resolution/frame rate can be supported:

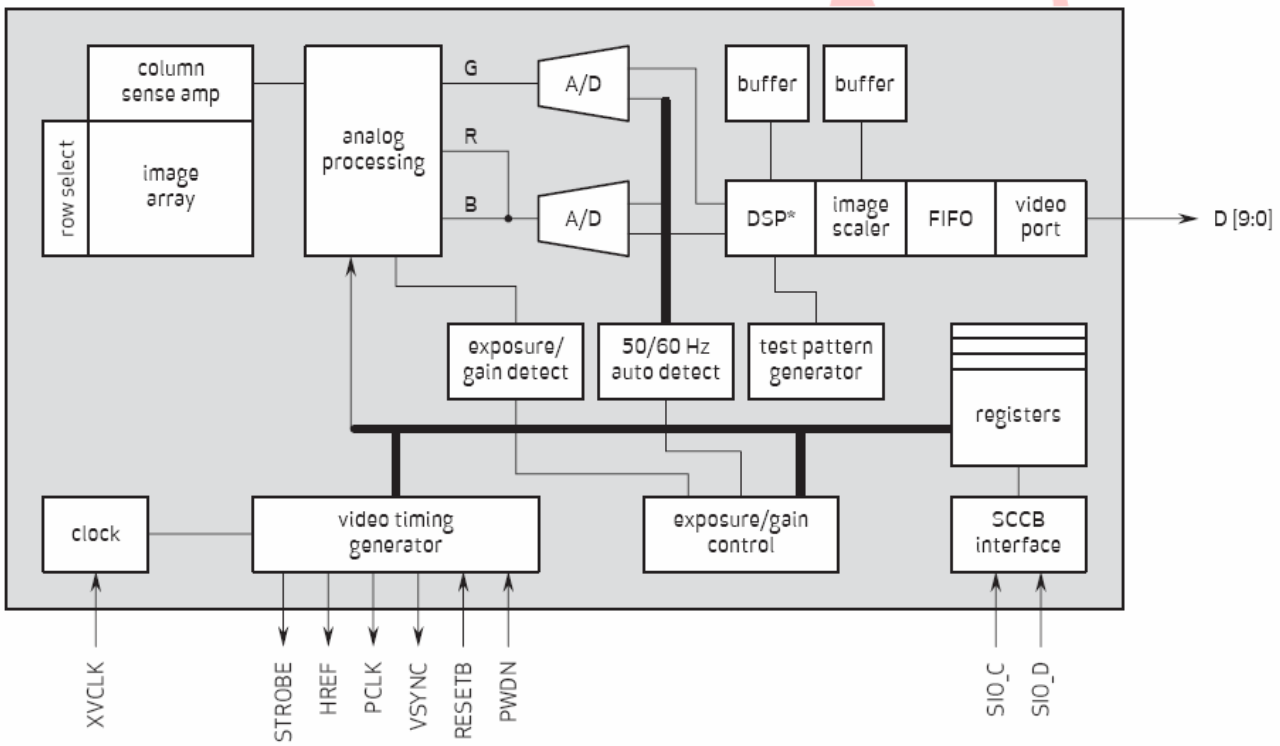
For USB High Speed: VGA 30fps

◆. OV9660 Feature

OV9660 CamerChip image sensor is low voltage CMOS device that provides the full functionality of a single-chip SXGA(1280X1024) camera and image processor in a small footprint package.The OV9660 provides full-frame,sub-sampled,scaled or windowed 8-bit/10-bit images in a wide range of formats,controlled through the Serial Camera Control Bus(SCCB) interface.

This product has an image array capable of operating at up to 15 frames per second(fps) in SXGA resolution with complete user control over imge quality,formatting and output data transfer.All required image processing functions,including exposure control,gamma,white balance,color saturation,hue control,gamma,white balance,color saturation,hue control,defect pixel canceling,noise canceling,and more,are also programmable through the SCCB interface.In addition,OmniVision sensors use proprietary sensor technology to improve image quality by reducing or eliminating common lighting/electrical sources of image contamination,such as fixed patter noise,smearing,etc,to produce a clean,fully stable color image.

Figure 2 Functional Block Diagram



note 1 DSP* (lens shading correction, de-noise, defect pixel correction, auto white balance, etc.)

Key Information

Camera Module No. CP8132-D130SF-E			
NB Camera Module	Module Size		60.0mm x 8.0mm x 4.6mm
	Resolution		≥400 TV line（@0.7Field）
	Input Supply Power		5V±5%
	Driver On Current		TBD mA
	Video Streaming Current		TBD mA
	Suspend Current		TBD μA
	Focal Range		50cm-infinity
	Temperature Range	Operation	-20° C to 70° C
		Stable Image	0° C to 50° C
	Application Area		Notebook,UMPC,Netbook,PC multimedia
	LED Indicator Color		Red(On when opening stream)
DSP	DSP Type		VC0343TLNB(Controller IC for NB Embedded USB 2.0 PC Camera)
	Support Sensor		up to 3.0Mega CMOS Sensor
	Frame Rate	VGA	30fps
		SXGA	7.5～15fps
		UXGA	5～15fps
	Campture Still Image Size		Up To 3M Pixel Resolution
	Compatibility		USB 2.0 Compliant,Microsoft WHQL Certified
			USB Video Class 1.1
	OS Supported		Windows XP(with service pack 2)&Vista
	Power Supply Voltage	Core	1.8V(1.62V to 1.98V)
		I/O	3.3V(3.0V to 3.6V)
	Output Video Fromat		YUY2(16bits/pixel)
			RGB24
			Raw Bayer Data(raw 8 or 10 bits/pixel)
			MJPEG
	Suspend Supply Current		<300μA
	Package		48-Pin Tiny QFN at 6.5mmx5mmx0.85mm
	Clock		TBD
	UVC		Support
	Image Reverse		Support(Flip and Mirror)
SENSOR	Sensor Type		OV9660
	Array Size		1280 X 1024(SXGA)
	Power supply	Analog	2.8V（2.45V to 3.0 V）
		I/O	1.8V(1.71V to 3.0V)
	Image Area		2608μm x 2072μm
	Sensitivity		450 Mv/(Lux.sec)
	S/N Ratio		40 dB
	Dynamic Range		55 dB
	Power requirement	Active	80 mW typical(15fps)
		Standby	15 μA typical
	Output Formats(8-bit)		YUV/YCbCr 4:2:2 RGB565/555/444 Raw Bayer Data
	Fixed Pattern noise		1% of $V_{peak-to-peak}$
	Dark current		3 Mv/sec@60° C
	Pixel size		2.0μm x 2.0μm
LENS	EFL		2.5mm
	F.NO		2.8±5%
	FOV(Max/D/H/V)		70° /66° /54.3° /44.5°
	Distortion		<1%
	Construction		3Plastic+ IR(650+/-10nm@50%)
	Focus		Fixed

Pin Assignment

No.	Name	Pin type	Description
1	USB-POWER（+5V）	Power Pin	USB power Input
2	USB-PADP（D-）	Data Pin	USB data Transmission
3	USB-PADM（D+）	Data Pin	USB data Transmission
4	GND	GND	Ground
5	SHIELD GND	GND	SHIELD ground

Electrical Characteristics

◆ OV9660 Characteristics

1. Absolute Maximum Ratings

Ambient Storage Temperature		-40ºC to +95ºC
Supply Voltages (with respect to Ground)	V_{DD-A}	4.5 V
	V_{DD-IO}	4.5 V
All Input/Output Voltages (with respect to Ground)		-0.3V to V_{DD-IO}+0.5V
Lead-free Temperature, Surface-mount process		245ºC

NOTE: Exceeding the Absolute Maximum ratings shown above invalidates all AC and DC electrical specifications and may result in permanent device damage.

2.DC Characteristics (-30℃<Ta<70℃)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{DD-A}	DC supply voltage – analog	–	2.45	2.8	3.0	V
V_{DD-IO}	DC supply voltage – I/O	–	1.71	1.8	3.0	V
I_{DDA}	Active (operating) current	See Note [a]		17 + 18[b]	50	mA
$I_{DDS-SCCB}$	Standby current	See Note [c]		1	2	mA
$I_{DDS-PWDN}$	Standby current			15	30	µA
V_{IH}	Input voltage HIGH	CMOS	0.7 x V_{DD-IO}			V
V_{IL}	Input voltage LOW				0.3 x V_{DD-IO}	V
V_{OH}	Output voltage HIGH	CMOS	0.9 x V_{DD-IO}			V
V_{OL}	Output voltage LOW				0.1 x V_{DD-IO}	V

a. At 25°C, V_{DD-A} = 2.8V, V_{DD-IO} = 1.8V
$I_{DDA} = \Sigma\{I_{DD-A} + I_{DD-IO}\}$, f_{CLK} = 24MHz at 15 fps YCbCr output with typical loading

b. I_{DD-IO} = 17mA, I_{DD-A} = 18mA, with typical loading

c. At 25°C, V_{DD-A} = 2.8V, V_{DD-IO} = 1.8V
$I_{DDS-SCCB}$ refers to a SCCB-initiated Standby, while $I_{DDS-PWDN}$ refers to a PWDN pin-initiated Standby

3. Functional and AC Characteristics (-30℃< Ta < 70℃)

Symbol	Parameter		Min	Typ	Max	Unit
Functional Characteristics						
	A/D Differential non-linearity			± 1/2		LSB
	A/D Integral non-linearity			± 1		LSB
Inputs (PWDN, XVCLK and RESETB)						
f_{CLK}	Input clock frequency	With PLL	10	24	27	MHz
		Without PLL	10	24	54	MHz
$t_{CLK:DC}$	Clock duty cycle		45	50	55	%
$t_{S:RESETB}$	Setting time after software/hardware reset				1	ms
$t_{S:REG}$	Settling time for register change				300	ms
SCCB Timing (see Figure 4)						
f_{SIO_C}	Clock frequency				400	KHz
t_{LOW}	Clock low period		1.3			μs
t_{HIGH}	Clock high period		600			ns
t_{AA}	SIO_C low to data out valid		100		900	ns
t_{BUF}	Bus free time before new START		1.3			μs
$t_{HD:STA}$	START condition hold time		600			ns
$t_{SU:STA}$	START condition setup time		600			ns
$t_{HD:DAT}$	Data in hold time		0			μs
$t_{SU:DAT}$	Data in setup time		100			ns
$t_{SU:STO}$	STOP condition setup time		600			ns
t_R, t_F	SCCB rise/fall times				300	ns
t_{DH}	Data out hold time		50			ns
Outputs (VSYNC, HREF, PCLK, and D[9:0] (see Figure 5, Figure 6, and Figure 7)						
t_{PDV}	PCLK[↓] to data out valid				5	ns
t_{SU}	D[9:0] setup time		15			ns
t_{HD}	D[9:0] hold time		8			ns
t_{PHH}	PCLK[↓] to HREF[↑]		0		5	ns
t_{PHL}	PCLK[↓] to HREF[↓]		0		5	ns
AC Conditions:	• V_{DD}: V_{DD-A} = 2.8V, V_{DD-IO} = 1.8V • Rise/Fall Times: I/O: 5ns, Maximum SCCB: 300ns, Maximum • Input Capacitance: 10pf • Output Loading: 20pF • f_{CLK}: 24MHz					

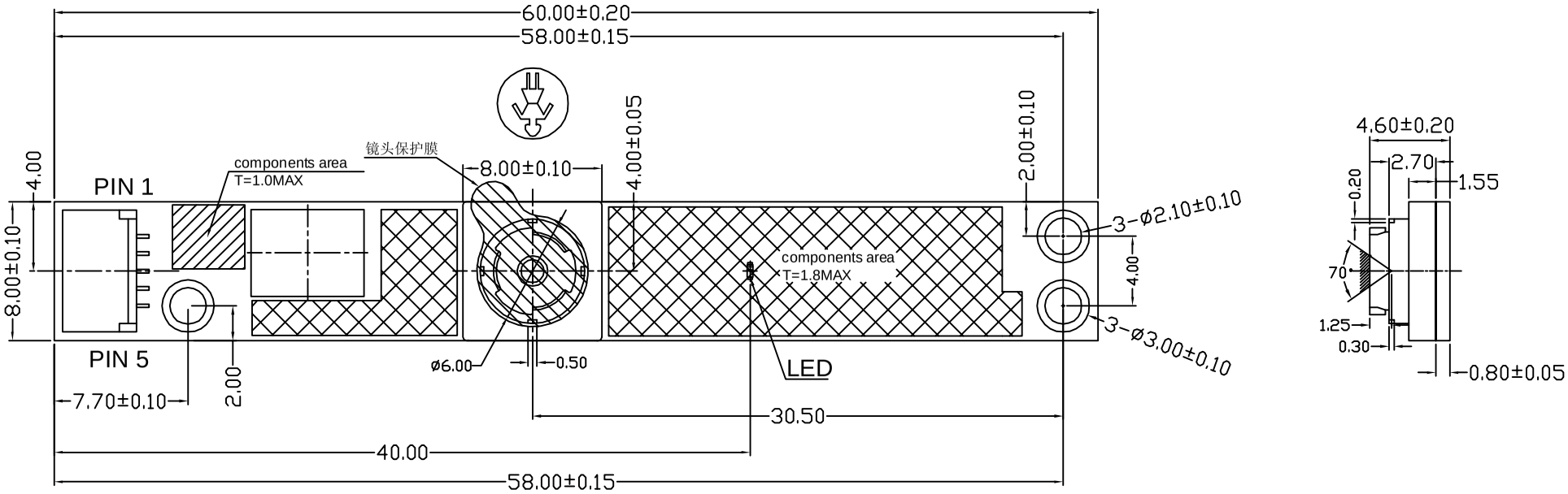
Note: For more information of sensor please refer to the OV9660 and VC0343 specification.

Mechanical Drawing

RoHS

Customer No.:

CP8132-D130SF-E Camera Module



主要参数(Module Specification)	
焦距(EFL)	2.5 mm
光圈(F.NO)	2.8
视场角(View Angle)	70°
畸变(Distortion)	<1 %
解象力(Image Quality)	≥400 TV line
景深(Focusing Range)	50 cm~Infinity
感光芯片(Chip Type)	OV9660
象素(Array Size)	1.3M
镜头类型(lens Size)	1/5.5 INCH 3P+IR

PIN DESCRIPTION

1	USB-POWER(+5V)
2	USB-PADP(D-)
3	USB-PADM(D+)
4	GND
5	SHIELD GND

CUSTOMER APPROVE		AMEND			光电感应模组
Mechanical	Electrical	△			TOLERANCE : DECIMAL .x ± .30 .xx ± .20 ∠ ± 1/4°
		△			
		△			
		1	更正模组外形尺寸及镜头的EFL值	20081217	
		NO.	CONTENT	DATE	

TRULY SEMICONDUCTORS LTD.

PRODUCT NO.		DRAW NO.	REV
CP8132-D130SF-E		标准品	B
DWN Francis 20081217	DSN Francis 20081217		
CHKD Francis 20081217	APPD 刘铁楠 20081217		
NOT IN SCALE	UNIT mm	SHEET: 1/1	

Appearance Specification

NO.	Item	Standard	Importance Class
1	Top side of Lens	No obvious impurity and oil impurity on the front of lens within the half area; The defect(unfeeling) limitation: width≤1mm, length≤2mm, the defect number≤2; No feeling defect; The width of defects and gaps on the outside of Lens≤0.3mm. Others are unlimited.	A
2	Screw glue	Glue homogeneous distributing around lens circle side .Not allows to excess glue over the height of Lens and Holder outside.	A
3	L1 Plastic	No defect and dust check from 45° angle under the reflexing light and from 0° under the highlight	A
4	Holder	No obvious impurity and distortion of outline. The width and length of defect is unlimited, the depth≤ 0.1mm and ≤1/4 of the thickness of Holder.	B
5	Sealed glue	Glue distributing between holder and FPC must be homogeneous and smooth. Not allows to excess glue over the width of holder.	A
6	FPC/PCB	Edge defect limitation: width≤1/2H(H is minimum.)、length≤1mm、defect numbers per edge≤2(No tearing gap inby edge for FPC); Edge outshoot limitation (width≤0.3mm,length≤1mm); No obvious impurity on the surface, label and mark shall be recognizable and Clear	A
7	Double coated tapes	Adhered direction shall be right. Not allows to excess steel plate edge. No alveoli and stick. Not allows to peel glue and rip protective paper when tear the protective paper.	B
8	Protective film	No dust in the glue side. Not allows to float or drop. Adhered direction shall be right.	B

Remark:

1. The definition of the appearance importance class

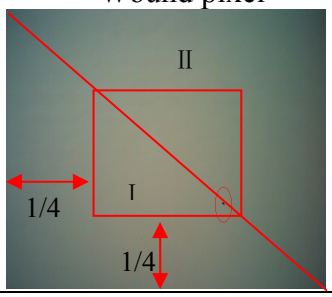
A: The defect can be found in the finished product, or have obvious visual differences from good products, such as crack, defect and dust, or influence image quality, or are appointed by the customer. We will emphasize these items and check all products.

B: The defect can be found in the finished product and has visual difference from the good one, but will not affect customer's aesthetic judgement. Or the defect can not be found in the finished product and will not generate functional problem, but will slightly influence sequential manufacture process or condition. We will supervise these items in the manufacturing process and check products selectively.

2. Sampling standard

Referenced standard: GB/T 2828.1-2003/ISO 2859-1:1999 and ANSI/ASQC.4-1993 Ⅱ

Image Specification

NO.	Item	Standard	Important Class
1	TV Line	Center≥500 8 point of 0.7 viewing field ≥400	A
2	Shading	The lighteness of 90% viewing area ≥ 40% of center lighteness(Lens correction Shading [Turn off]); The lighteness of 90% viewing area ≥ 60% of center lighteness(Lens correction Shading [Turn on])	A
3	Dust	No dust in the center viewing area; Border area according to the limit samples	A
4	Dead pixel	No in the viewing area.	A
5	Wound pixel 	I area：Blemish number≤1 II area：Blemish number≤4	B
6	Color	Color distortion ratio of center±15%	B
7	Gray Scale	Margin of two near scales' brightness≥6	B
8	Distortion	＜1%	B
9	Flare	No flare in 45° viewing angle; No ghost in full viewing angle	B

QA Plan

NO.	Item	Sampling frequency	Measure	Remark
Image and reliability item				
1	TV Line	AQL 0.65 II Class	Same as production	100% Inspection
2	Shading	AQL 0.65 II Class	Same as production	100% Inspection
3	Dust	AQL 0.65 II Class	Same as production	100% Inspection
4	Dead pixel	AQL 0.65 II Class	Same as production	100% Inspection
5	Wound pixel	AQL 1.5 II Class	Same as production	100% Inspection

6	Color	AQL 1.5 Ⅱ Class	Same as production	100% Inspection
7	Gray Scale	AQL 1.5 Ⅱ Class	Same as production	100% Inspection
8	Distortion	N=5,c=0 per batch	Same as production	Sampling by QA
9	Flare	N=5,c=0 per batch	Same as production	Sampling by QA
Appearance Check Items				
1	Top side of Lens	AQL 1.0 Ⅱ Class	Same as production	100% Inspection
2	Screw glue	AQL 1.0 Ⅱ Class	Same as production	100% Inspection
3	L1 Plastic	AQL 1.0 Ⅱ Class	Same as production	100% Inspection
4	Holder	AQL 1.5 Ⅱ Class	Same as production	100% Inspection
5	Sealed glue	AQL 1.0 Ⅱ Class	Same as production	100% Inspection
6	FPC/PCB	AQL 1.0 Ⅱ Class	Same as production	100% Inspection
7	Double Coated Tapes	AQL 1.5 Ⅱ Class	Same as production	100% Inspection
8	Protective Film	AQL 1.5 Ⅱ Class	Same as production	100% Inspection

Sample:

Referenced standard: GB/T 2828.1-2003/ISO 2859-1:1999 and ANSI/ASQC.4-1993 Ⅱ

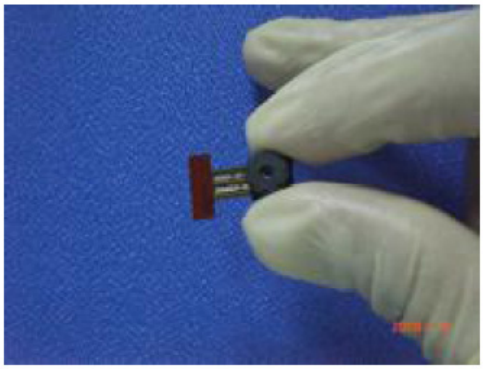
PRECAUTIONS FOR USING CCM MODULES

Handing Precautions

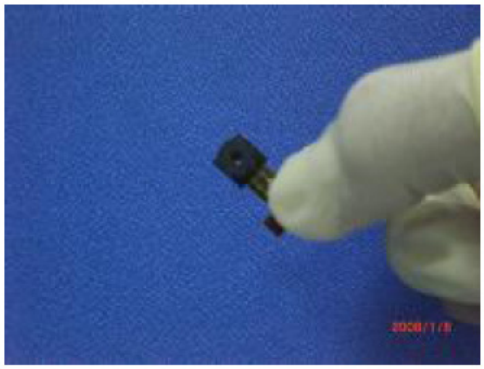
—DO NOT try to open the unit enclosure as there is no user-serviceable component inside. To prevent damage to the camera module by electrostatic discharge, handling the camera module only after discharging all static electricity from yourself and ensuring a static-free environment for the camera module.
—DO NOT touch the top surface of the lens.
—DO NOT press down on the lens.
—DO NOT try to focus the lens.
—DO NOT put the camera module in a dusty environment.
—To reduce the risk of electrical shock and damage to the camera module, turn off the power before connect and disconnect the camera module.
—DO NOT drop the camera module more than 60 cm onto any hard surface.
—DO NOT expose camera module to rain or moisture.
—DO NOT expose camera module to direct sunlight.
—DO NOT put camera in a high temperature environment.
—DO NOT use liquid or aerosol cleaners to clean the lens.
—DO NOT make any charges or modifications to camera module.
—DO NOT subject camera module to strong electromagnetic field.
—DO NOT subject the camera module to excessive vibration or shock.

—DO NOT Impact or nip CCM module with spiculate things
—DO NOT alter, modify or change the shape of the tab on the metal frame.
—DO NOT make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
—DO NOT damage or modify the pattern writing on the printed circuit board.
—Absolutely DO NOT modify the zebra rubber strip (conductive rubber) or heat seal connector
—Except for soldering the interface, DO NOT make any alterations or modifications with a soldering iron.
—DO NOT twist FPC of CCM.

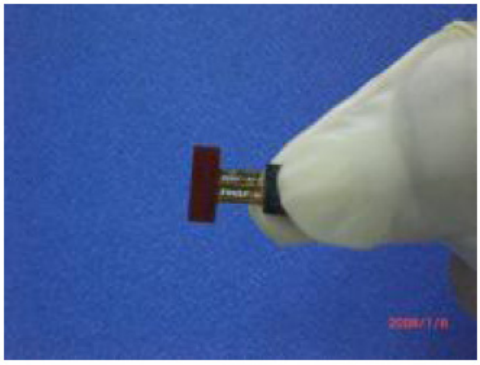
Apply indication



Correct



Incorrect



Incorrect

Precaution for soldering the CCM:

	Manual soldering	Machine drag soldering	Machine press soldering
No ROHS product	290℃ ~350℃. Time: 3-5S.	330℃ ~350℃. Speed: 4-8 mm/s.	300℃ ~330℃. Time: 3-6S. Press: 0.8~1.2Mpa
ROHS product	340℃ ~370℃. Time: 3-5S.	350℃ ~370℃. Speed: 4-8 mm/s.	330℃ ~360℃. Time: 3-6S. Press: 0.8~1.2Mpa

(1) If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation. (This does not apply in the case of a non-halogen type of flux.) It is recommended that you protect the lens surface with a cover during soldering to prevent any damage due to flux spatters.
(2) The CCM module and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the soldering iron.

Other precautions

For correct using please refer to the relative criterions of electronic products.

Limited Warranty

Unless agreed between TRULY and customer, TRULY will replace or repair any of its CCM modules which are found to be functionally defective when inspected in accordance with TRULY CCM acceptance standards for a period of one year from date of shipments. Cosmetic/visual defects must be returned to TRULY within 90 days of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of TRULY limited to repair and/or replacement on the terms set forth above. TRULY will not be responsible for any subsequent or consequential events.

Return CCM under warranty

No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are:

-Holder is apart from module.
-Holder or Connector is anamorphic.
-Connector is turnup.
-FPC is lacerated or discon-nexion, and so on.

Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet, conductors and terminals.

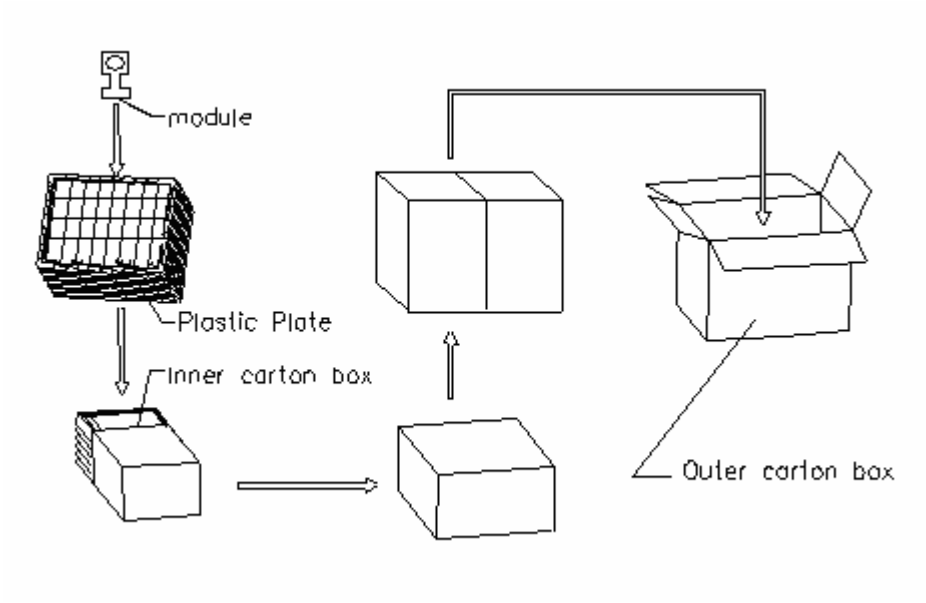
Package Specification

Packaging Design

Product No.	CP8132-D130SF-E	Release date			
Product name	Compact Camera Module	Releaser			
Supplier	TRULY SEMI CONDUCTORS LTD	Recycle		( )YES	( )NO
Quantity/ each box	TBD	Material for box		( ) paper	( ) plastic
Outer carton box size	TBD	Box type		( )new	( )update
Quantity / inner box *	TBD	Weight	g / pcs	BOX=TYPE	

Quantity / outer box			Kg / outer box	Record of SRF Dept.	Kg(Max)

Packing Standards:



There are TBD modules each plastic plate.

There are TBD modules each inner carton box..

There are TBD inner carton boxes each outer carton box.

Requirements of outer carton box :

1. Weight(Max): TBD Kg
2. Height (Max): TBD M
3. Prohibition: Box made by log

Material for Plastic tray

It is made of antistatic polystyrene which has no chemical pollution. Surface resistivity : 10^6 ohm/sq

PRIOR CONSULT MATTER

1.①For Truly standard products, we keep the right to change material, process for improving the product property without notice on our customer.
②For OEM products, if any change needed which may affect the product property, we will consult with our customer in advance.
2. If you have special requirement about reliability condition, please let us know before you start the test on our samples.

FACTORY CONTACT INFORMATION

FACTORY NAME: TRULY SEMICONDUCTORS LTD.
FACTORY ADDRESS: Truly Industrial Area, ShanWei City, GuangDong, China
FACTORY PHONE: 86-0660-3380061 FAX: 86-0660-3371772