PRODUCT	:	CAMERA MODULE
MODEL NO.	:	CS3319-D030SF-E
SUPPLIER	:	TRULY SEMICONDUCTORS LTD.
DATE	:	November 5, 2008

CERT. No. 946535
ISO9001
TL9000

SPECIFICATION

Revision: 1.0

CS3319-D030SF-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
1.0	2008-11-05	First release	

CONTENTS

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

Key Information

Module No.		CS3319-D030SF-E
Module Size		20.0mm x 20.0mm x 16.58mm
Image Quality		≥250 TV line
Sensor Type		OV7221
Array Size		640 X 480(VGA)
Power supply	Digital Core	1.8VDC+/-10%
	Analog	3.0V to 3.6V
	I/O	1.7V to 3.3V
Lens		1/4 inch 2Plastic+1G
Focus(F.NO)		2.0
View Angle		D(112°)H(93°)V(72°)
Image Area		3984μm x 2952μm
Object distance		1M-infinity
sensitivity		4.9 v/Lux-sec
Pixel size		6.0μm x 6.0μm
Sensor Temperature Range		-20° C to +70° C
Output Formats(8-bit)		.YUV/YCbCr 4:2:2 .RGB 565/555/444 GRB 4:2:2 .Raw RGB Data
Maximum Image Transfer Rate		60 fps for VGA
S/N Ratio		50db
Dynamic Range		60db
IC Package		28-pin CLCC
substrate		FPC
Assembly technique		Plastic Rivet + Glue
Power requirement	Active	120 Mw typical(60fps VGA,YUV)
	standby	<20μA
Fixed Pattern noise		<0.03% of Vpeak-to-peak
Dark current		40mV/s
Package		Antistatic Plastic

Pin Assignment

No.	Name	Pin type	Description
1	NC		
2	AGND	Power	Analog Ground
3	SIO_D	I/O	SCCB serial interface data I/O
4	AVDD	Power	Analog power supply
5	SIO_C	Input	SCCB serial interface clock input
6	RESET	Input (0)	System reset input ,active low
7	VSYNC	Output	Vertical sync output
8	PWDN	Input (0)	Power Down Mode Selection 0: Normal mode 1: Power down mode
9	HREF	Output	HREF output
10	DVDD	Power	Power supply for digital logic core
11	DOVDD	Power	Digital power supply for I/O
12	Y9	Output	Data output bit[9]
13	XCLK	Input	Crystal clock input
14	Y8	Output	Data output bit [8]
15	DGND	Power	Digital Ground
16	Y7	Output	Data output bit [7]
17	PCLK	Output	Pixel clock output
18	Y6	Output	Data output bit [6]
19	Y2	Output	Data output bit [2]
20	Y5	Output	Data output bit [5]
21	Y3	Output	Data output bit [3]
22	Y4	Output	Data output bit [4]
23	Y1	Output	Data output bit [1]
24	Y0	Output	Data output bit [0]

Electrical Characteristics

1. Absolute Maximum Ratings

Ambient Storage Temperature		-40°C to +95°C
Supply Voltages (with respect to Ground)	V_{DD-A}	4.5 V
	V_{DD-C}	3 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		245°C

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 (-20℃<Ta<70℃)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{DD-A}	DC supply voltage – analog	–	3.0	3.3	3.6	V
V_{DD-C}	DC supply voltage – digital core	See Note [a]	1.62	1.8	1.98	V
V_{DD-IO}	DC supply voltage – I/O	See Note [a]	1.7	–	3.3	V
I_{DDA}	Active (operating) current	See Note [b]		10 + 19[c]		mA
$I_{DDS-SCCB}$	Standby current	See Note [d]		1		mA
$I_{DDS-PWDN}$	Standby current			10	20	µA
V_{IH}	Input voltage HIGH	CMOS	0.7 x V_{DD-IO}			V
V_{IL}	Input voltage LOW				0.2 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
I_{OH}	Output current HIGH	See Note [e]	8			mA
I_{OL}	Output current LOW		15			mA
I_L	Input/Output leakage	GND to V_{DD-IO}			± 1	µA

a. V_{DD-IO} should not be lower than 2.45V when using the internal regulator for V_{DD-C} (1.8V). When not using the internal regulator, V_{DD-C} requires external 1.8V power that must not be higher than V_{DD-IO}.

b. At 25°C, V_{DD-A} = 3.3V, V_{DD-C} = 1.8V, V_{DD-IO} = 3.3V
$I_{DDA} = \Sigma\{I_{DD-C} + I_{DD-A}\}$, f_{CLK} = 24MHz at 30 fps YUV output, no I/O loading

c. I_{DD-C} = 10mA, I_{DD-A} = 19mA, without loading

d. At 25°C, V_{DD-A} = 3.3V, V_{DD-C} = 1.8V, V_{DD-IO} = 3.3V
$I_{DDS-SCCB}$ refers to a SCCB-initiated Standby, while $I_{DDS-PWDN}$ refers to a PWDN pin-initiated Standby

e. Standard Output Loading = 25pF, 1.2KΩ

a. V_{DD-A} = 2.5V, V_{DD-C} = 1.8V, V_{DD-IO} = 2.5V
$I_{DDA} = \Sigma\{I_{DD-IO} + I_{DD-C} + I_{DD-A}\}$, f_{CLK} = 24MHz at 7.5 fps YUV output, no I/O loading

b. V_{DD-A} = 2.5V, V_{DD-C} = 1.8V, V_{DD-IO} = 2.5V
$I_{DDS:SCCB}$ refers to a SCCB-initiated Standby, while $I_{DDS:PWDN}$ refers to a PWDN pin-initiated Standby

c. Standard Output Loading = 25pF, 1.2KΩ

3. Functional and AC Characteristics (-20℃< 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
	AGC Range			30	dB
	Red/Blue adjustment range			12	dB
Inputs (PWDN, CLK, RESET#)					
f_{CLK}	Input clock frequency	10	24	48	MHz
t_{CLK}	Input clock period	21	42	100	ns
$t_{CLK:DC}$	Clock duty cycle	45	50	55	%
$t_{S:RESET}$	Setting time after software/hardware reset			1	ms
$t_{S:REG}$	Settling time for register change (10 frames required)			300	ms
SCCB Timing (see Figure 4)					
f_{SCL}	Clock frequency			400	KHz
t_{LOW}	Clock low period	1.3			μs
t_{HIGH}	Clock high period	600			ns
t_{AA}	SCL 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, Figure 7, and Figure 8)					
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-C} = 1.8V, V_{DD-A} = 3.3V, V_{DD-IO} = 3.3V • Rise/Fall Times: I/O: 5ns, Maximum SCCB: 300ns, Maximum • Input Capacitance: 10pf • Output Loading: 25pF, 1.2KΩ to 3.3V • f_{CLK}: 24MHz				

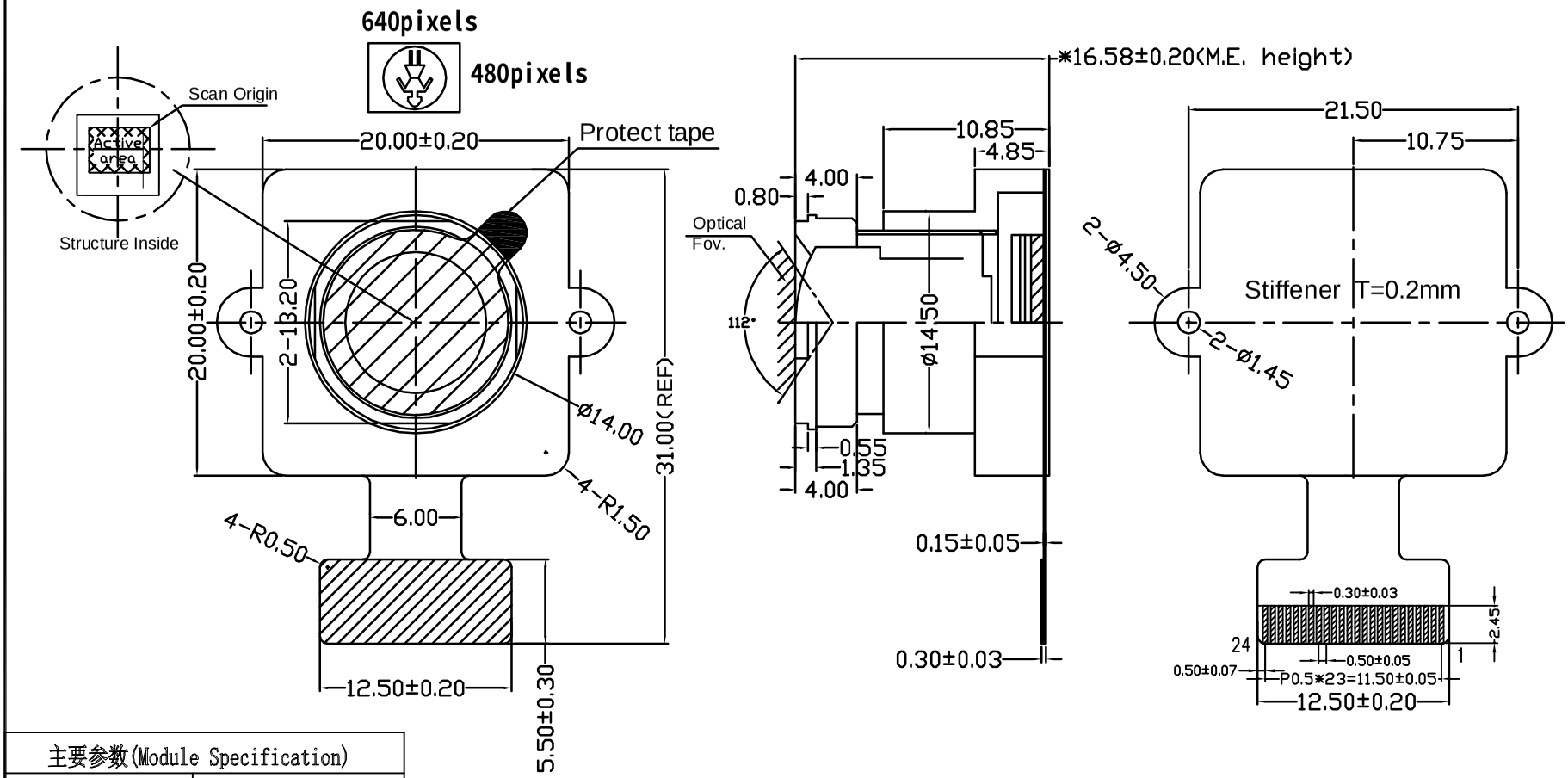
Note: For more information of sensor please refer to the OV7221 specification.

Mechanical Drawing

RoHS

CS3319-D030SF-E Camera Module

Customer No.:



24PIN DESCRIPTION

PIN NO	NAME
1	NC
2	AGND
3	SIOD
4	AVDD
5	SIOC
6	RESET
7	VSYNC
8	PWDN
9	HREF
10	DVDD
11	DOVDD
12	Y9
13	XCLK
14	Y8
15	DGND
16	Y7
17	PCLK
18	Y6
19	Y2
20	Y5
21	Y3
22	Y4
23	Y1
24	Y0

主要参数(Module Specification)	
焦距(EFL)	2.25mm
光圈(F.NO)	2.0
视场角(View Angle)	D(112°)H(93°)V(72°)
畸变(Distortion)	<16 %
解象力(Image Quality)	≥250 TV line
景深(Focusing Range)	1M~infinity
感光芯片(Chip Type)	OV7221
象素(Array Size)	0.3M
镜头类型(lens Size)	1/4INCH 2P+1G

NOTICE:
1.Unspecificed Tolerrance ± 0.20mm
2.* IS Critical Dimension
3.Match Connector FH19SC-24S-0.5SH(05)

CUSTOMER APPROVE		AMEND			光电感应模组
Mechanical	Electrical	△			TOLERANCE DECIMAL .x ± .30 .xx ± .20 ∠ ± 1/4°
		△			
		△			
		△			
		NO.	CONTENT	DATE	

TRULY SEMICONDUCTORS LTD.

PRODUCT NO.	DRAW NO.	REV
CS3319-D030SF-E		A
DWN Xray 2008/07/07	DSN Xray 2008/07/07	
CHKD Bruce Ma 2008/07/07	APPD Laurence Liu 2008/07/07	
NOT IN SCALE	UNIT mm	SHEET:

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	Normally screw glue shall be symmetrical distributed around lens circle side. Particular circs, glue distribution must not disturb customer's assembly operation.	A
3	L1 Glass	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	Sealed glue distributing between holder and FPC must be symmetrical and smooth. Not allow glue leakage and asymmetric thickness. After holder assembly, the thickness distance between one side and its opposite side shall be less than 0.2mm. Excess glue over the holder shall not make the outside dimension be out of control.	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 and crease on the surface. If there was shield film on the surface, the spot size of the film shall be less than 0.3mm×1mm and no line is exposed. If it was not be cleaned and did not influence the total thickness, it would be permitted. Label and mark shall be clear enough to be discerned.	A
7	Connector	No dust, fingerprint, and not allows to turning colors, distortion; Solder must be well; No open circuit or short circuit	A

8	Gold finger	No dust, fingerprint, and not allows to turning colors, burned, unsmoothed and peeled; No open circuit or short circuit; The defect width shall be smaller than 20% of gold finger's width. No copper/nickel exposed in defect. Numbers of defected pin shall be less than 3. The defect limitation:width≤0.08mm,length≤5mm.	A
9	Stiffener	Holder anchor pole length overtopping the steel plate shall be less than 0.2mm. No dust, rust and deep scratch on the steel surface without Double coated tapes.	B
10	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
11	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

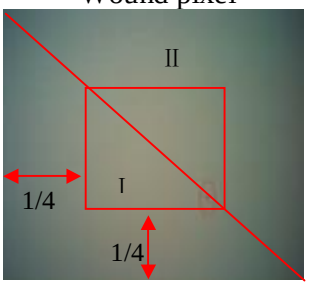
A: The defect can be found in the finished product, or have obvious visual differences from good products, such as crack, defect and dust, or influence image quality, or are appointed by the customer. We will emphasize these items and check all products.

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≥300 8 point of 0.7 viewing field ≥200	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≤2 Ⅱ area：Blemish number≤6	B
6	Color	Color distortion ratio of center±15%	B
7	Gray Scale	Margin of two near scales' brightness≥6	B
8	Distortion	＜16%	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 Glass	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	Connector	AQL 1.0 Ⅱ Class	Same as production	100% Inspection
8	Gold finger	AQL 1.0 Ⅱ Class	Same as production	100% Inspection
9	Stiffener	AQL 1.5 Ⅱ Class	Same as production	100% Inspection
10	Double coated tapes	AQL 1.5 Ⅱ Class	Same as production	100% Inspection
11	Protective film	AQL 1.5 Ⅱ Class	Same as production	100% Inspection

Sample:

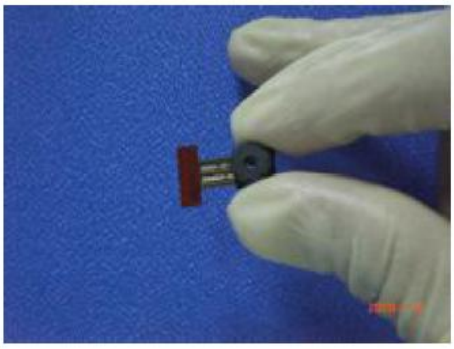
Referenced standard: GB/T 2828.1-2003/ISO 2859-1:1999 and ANSI/ASQC.4-1993 Ⅱ

PRECAUTIONS FOR USING CCM MODULES

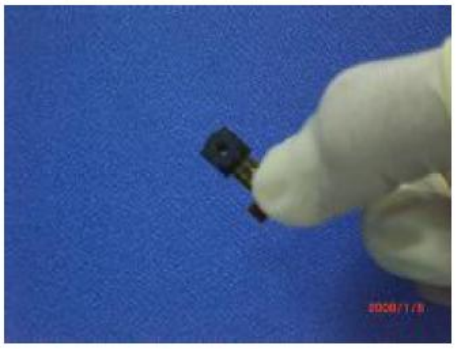
Handing Precautions

—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.

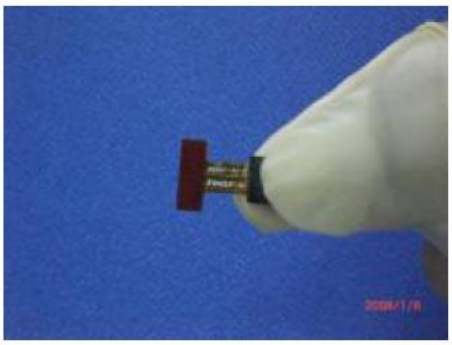
Apply indication



Correct



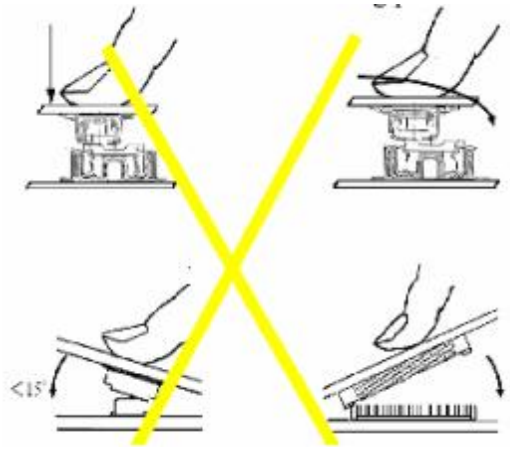
Incorrect

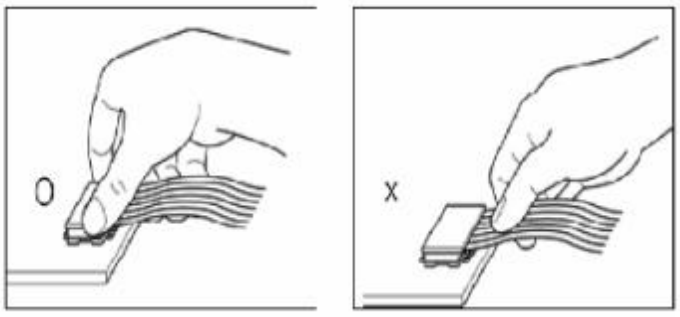


Incorrect

Precaution for assemble the module with BTB connector:

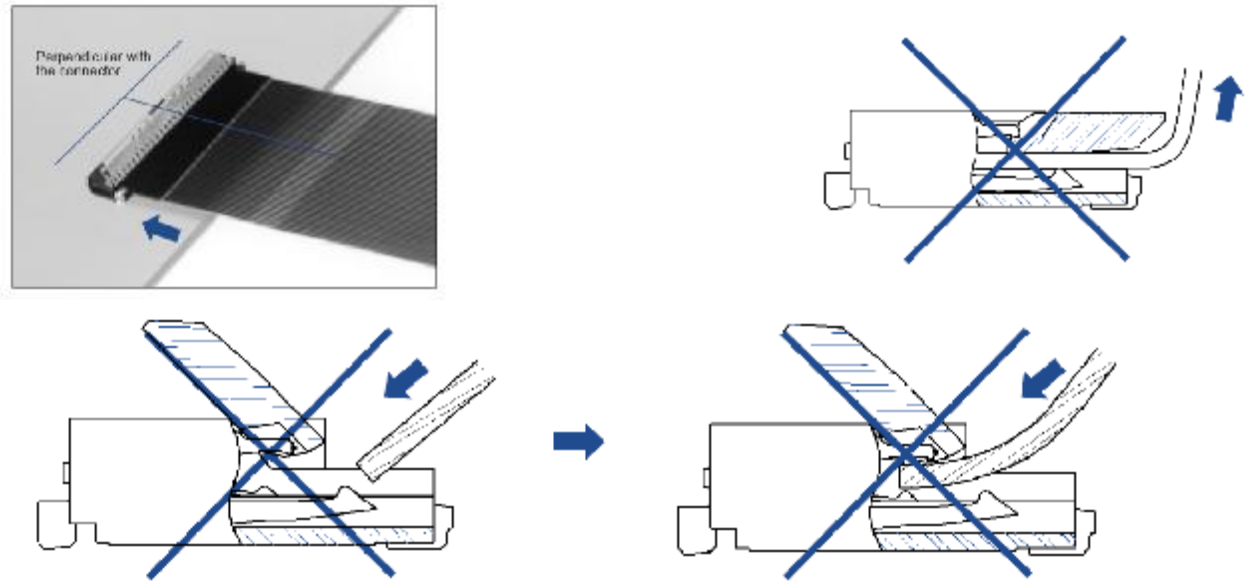
Please note the position of the male and female connector position, don't assemble or assemble like the method which the following picture shows





OK NG

Precaution for assemble the module with ZIF connector:



Precaution for soldering the CCM:

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

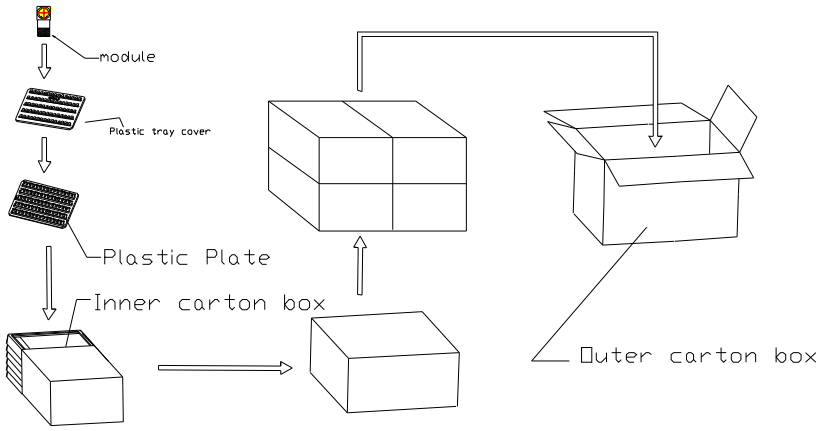
Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet, conductors and terminals.

Package Specification

Packaging Design One

Product No.	CS3319-D030SF-E	Release date			
Product name	Compact Camera Module	Releaser			
Supplier	TRULY SEMI CONDUCTORS LTD	Recycle		☐YES ■ NO	
uantity/ each box	TBD	Material for box		■ paper ☐ plastic	
Outer carton box size	405mm*290mm*290mm	Box type		■ new ☐ update	
Quantity / inner box * Quantity / outer box	TBD	Weight	g / pcs Kg / outer box	BOX=TYPE Record of SRF Dept.	TBD Kg(Max)

Packing Standards:



There are TBD modules each plastic plate.

There are TBD modules each inner carton box..

There are 4 each outer carton box.

Requirements of outer carton box :

1. Weight(Max): TBD Kg
2. Height (Max): 0.29 M
3. Prohibition: Box made by log

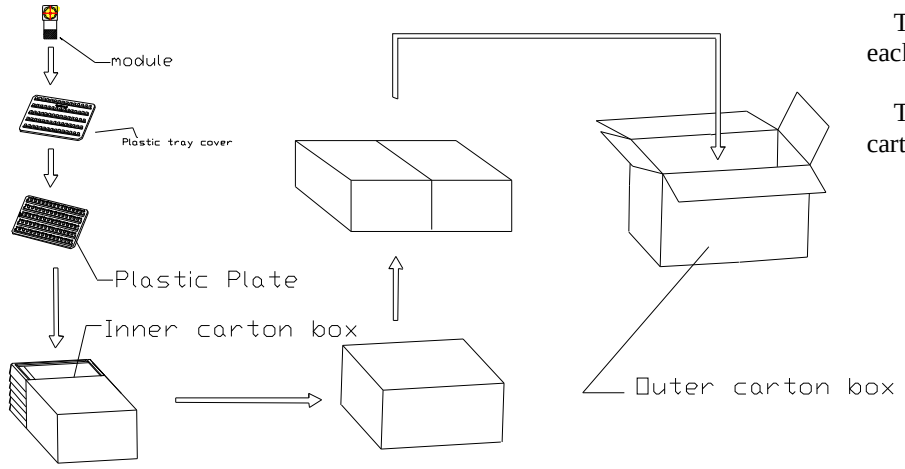
Material for Plastic tray

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

Packaging Design Two

Product No.	CS3319-D030SF-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	405 mm *290 mm *170 mm	Box type		■ new	☐ update
Quantity / inner box * Quantity / outer box	TBD	Weight	g / pcs Kg / outer box	BOX=TYPE Record of SRF Dept.	TBD Kg(Max)

Packing Standards:



There are TBD modules each plastic plate.

There are TBD modules each inner carton box..

There are 2 each outer carton box.

Requirements of outer carton box :

4. Weight(Max): TBD Kg
5. Height (Max): 0.17 M
6. 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