PRODUCT	:	CAMERA MODULE
MODEL NO.	:	CM8363-B1300BA-E
SUPPLIER	:	TRULY OPTO-ELECTRONICS LTD.
DATE	:	Nov 26th, 2012

CERT. No. 946535
ISO9001
TL9000

SPECIFICATION

Revision: 1.0

CM8363-B1300BA-E

MSL	Lead Free	ROHS
MSL 1		

If there is no special request from customer, TRULY OPTO-ELECTRONICS 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 OPTO-ELECTRONICS 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 OPTO-ELECTRONICS LTD.: CUSTOMER:

Quality Assurance Department:_____
Approved by:

Technical Department:_____

Approved by:

REVISION RECORD

REV NO.	REV DATE	CONTENTS	REMARKS
1.0	2012-11-26	First release	FULL

CONTENTS

n KEY INFORMATION

n AUTO-FOCUS SPECIFICATION

n PIN ASSIGNMENT

n ELECTRICAL CHARACTERISTICS

n MECHANICAL DRAWING

n APPEARANCE SPECIFICATION

n IMAGE SPECIFICATION

n RELIABILITY SPECIFICATION

n PRECAUTIONS FOR USING CCM MODULES

n PACKAGE SPECIFICATION

n PRIOR CONSULT MATTER

n FACTORY CONTACT INFORMATION

WRITTEN BY	CHECKED BY	APPROVED BY
LI FANG SEN	LIANG XIAOLONG	LIU TIE NAN

Key Information

Module No.		CM8363-B1300BA-E
Module Size		8.50mm × 8.50mm × 5.15mm
Sensor Type		MN34130
Array Size		4208 × 3152
Power Supply	Core	1.2V
	Analog	2.8V
	I/O	1.8V
Lens		1/3.1 inch 5Plastic+ IR
Focus(F.NO)		2.2
View Angle		74°
Image Area		Diagonal 5.888mm
Die dimensions		6252μm × 5502μm
Object Distance		10cm~infinity
Pixel Size		1.12μm × 1.12μm
IR Cutter		650nm
Temperature Range	Operating	-20°C to 60°C
Output Formats		8/10-bit RGB RAW
Maximum Image Transfer Rate	ALL-pix	15 fps@full scan mode，MIPI 4Line 10bit format
	ALL-pix	60 fps@full HD mode，MIPI 4Line 10bit format
	1080P	30 fps@ HD movie mode，V
	1080P	60 fps@ HD movie mode，H/V
	720P	60 fps@ HD movie mode，V
Input Clock Frequency		TBD
Substrate		R/FPC
IC Package		COB
Sensor Power Requirement	Active	TBD
	Standby	TBD

Auto-Focus Specification

NO.	Item	Specification
1	Auto-Focus Type	VCM (Voice Coil Motor)
2	VCM Driver	AD5823
3	Power Supply	2.8~3.3V
4	Rated Current	≤80mA
5	Resistance	19±3Ω
6	Focusing Range	10cm to infinity

Pin Assignment

No.	Name	Pin type	Description
1	DGND	Ground	Ground for digital circuit
2	DGND	Ground	Ground for digital circuit
3	DGND	Ground	Ground for digital circuit
4	ID	Output	Low，connect to GND
5	VDD_VCM2.8VA	Power	Power for VCM
6	PWDN_VCM	Input	Power down for VCM
7	SDA	I/O	SCCB data
8	DOVDD_1.8V	Power	Power for I/O circuit
9	SCL	Input	SCCB input clock
10	DVDD_1.2V	Power	Power for digital circuit
11	DGND	Ground	Ground for digital circuit
12	PWDN_SENSOR	Input	Power down (active low with internal pull up resistor)
13	CLK_N	I/O	MIPI TX clock lane negative output
14	NC		
15	CLK_P	I/O	MIPI TX clock lane positive output
16	DGND	Ground	Ground for digital circuit
17	DATA0_N	I/O	MIPI TX 0 data lane negative output
18	MCLK	Input	System input clock
19	DATA0_P	I/O	MIPI TX 0 data lane positive output
20	DGND	Ground	Ground for digital circuit
21	DATA1_N	I/O	MIPI TX 1 data lane negative output
22	FLASH	I/O	Flash control
23	DATA1_P	I/O	MIPI TX 1 data lane positive output
24	AVDD_2.7V	Power	Power for analog circuit
25	NC		
26	AGND	Ground	Ground for analog circuit
27	DATA2_N	I/O	MIPI TX 2 data lane negative output
28	DATA3_N	I/O	MIPI TX 3 data lane negative output
29	DATA2_P	I/O	MIPI TX 2 data lane positive output
30	DATA3_P	I/O	MIPI TX 3 data lane positive output

Electrical Characteristics

1. Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	notes
Supply voltage (analog)	VANA	-0.3 to +3.3	V	refer to Vss level
Supply voltage (digital)	VDIG	-0.3 to +2.0	V	
Supply voltage (interface)	VIF	-0.3 to +3.3	V	
Input voltage (digital)	VI	-0.3 to +3.3	V	
Output voltage (digital)	VO	-0.3 to +3.3	V	
Guaranteed Operating temperature	TOPR	-20 to +60	˚C	
Guaranteed storage temperature	TSTG	-30 to +80	˚C	
Guaranteed performance temperature	TSPEC	-20 to +60	˚C	

2. DC Characteristics

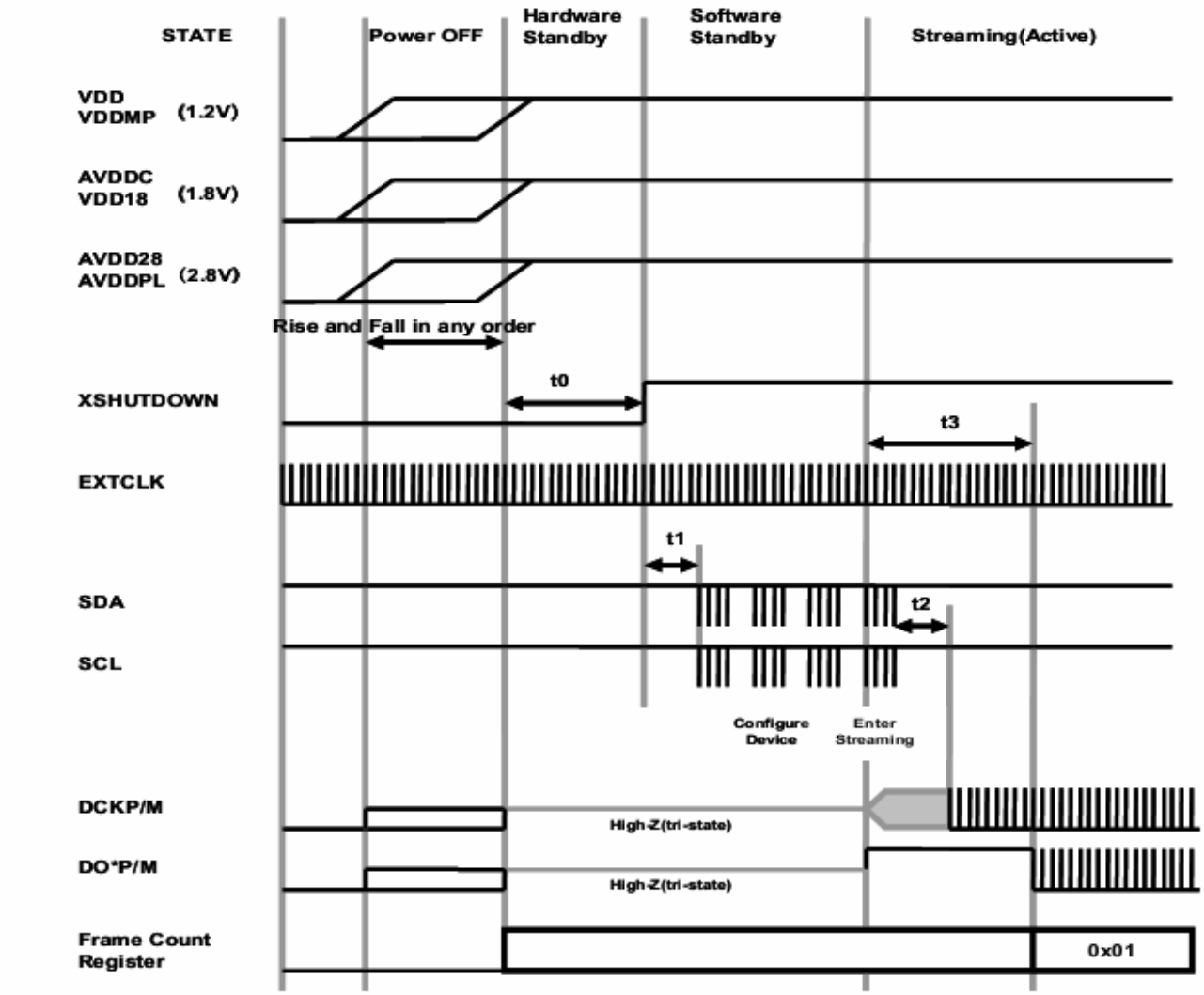
Parameter	Symbol	Operating voltage condition	Operating voltage condition			Unit
			Min.	Typ.	Max.	
Input level : XSHUTDOWN,SDA, SCL,EXTCLK,XCE						
Input voltage High level	V_{IH}		VDD18 × 0.7		AVDD28	V
Input voltage Low level	V_{IL}		0		VDD18 × 0.3	V
Input leak current	I_{LI}	V_I=VDD18 or GND			± 10	µA
Output level : MS,FS						
Output voltage High level	V_{OH}	I_O=-3.2mA	VDD18-0.6			V
Output voltage Low level	V_{OL}	I_O=3.2mA			0.4	V
Output leak current	I_{LO}	V_O=Hi-Z			± 10	µA
Output level : SDA						
Output voltage Low level	V_{OL}	I_O=-3.2mA			0.4	V
Output leak current	I_{LO}	V_O=Hi-Z			± 10	µA

Note: V_{OH} not valid for I2C Specification

3. AC Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output common-mode voltage (HS-mode)	V_{CMTX}	150	200	250	mV	–
Output high voltage (HS-mode)	V_{OHHS}			360	mV	–
Output differential voltage (HS-mode)	V_{OD}	140	200	270	mV	–
Output high level (LP-mode)	V_{OHLP}	1.1	1.2	1.3	V	–
Output low level (LP-mode)	V_{OLLP}	-50	0	50	mV	–
Terminal resistance value	Zdiff	80	100	125	Ω	–
V_{CM} range(HS-mode)	ΔV_{CM}	-5	—	5	mV	–
V_{OD} range(HS-mode)	ΔV_{OD}	-10	—	10	mV	–

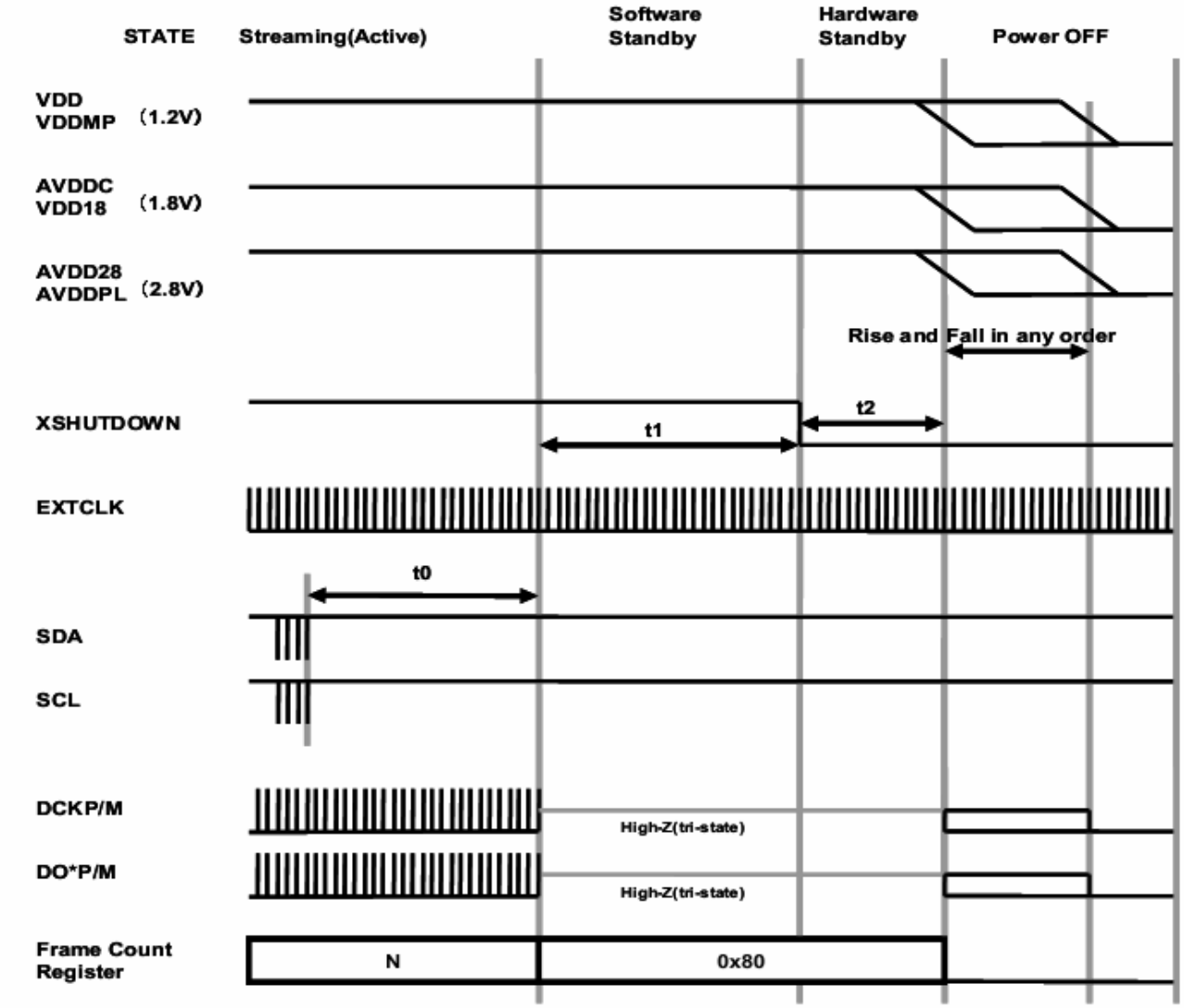
4.Power on sequence



Timing for Power on sequence

Constraint	Label	Min	Max	UNIT
VANA rising – XSHUTDOWN rising	t0	0	-	ns
XSHUTDOWN rising – First I2C transaction	t1	50	-	us
PLL Start up/Lock Time	t2	-	80	ms
Entering Streaming Mode – First Frame Start Sequence	t3	-	150	ms

5. Power down sequense



Timing for Power down sequence

Constraint	Label	Min	Max	UNIT
Enter Software Standby CCI command – Device in Software Standby mode	t0	If outputting a frame of CCP2 data wait to CCP2 frame end code before entering software standby, otherwise enter software standby mode immediately		
Last I2C Transaction or CCP2 frame end – XSHUTDOWN falling	t1	512	-	EXTCLK cycles
XSHUTDOWN falling – VANA falling	t2	0	-	ns

Note: For more information of sensor please refer to the MN34130 specification

6.Driver IC Specification

The AD5823 and AD5823-1 are single, 10-bit DACs with 100 mA output current sink capability and integrated Actuator Response Control™ (ARC™) technology. ARC is a revolutionary autofocus capture time and image quality enhancing technology developed by Analog Devices, Inc., and integrated into the AD5823/AD5823-1 VCM drivers. The unique and proprietary slew rate control modes of the AD5820 allow the user to customize the output transient response, thereby overcoming mechanical ringing associated with reduced form factor voice coil motors (VCMs).

ARC circuitry applies specialized, patented waveform and application technology to underdamped voice coil motors (VCMs) to reduce mechanical ringing. This technology enables the user to achieve very fast mechanical settling times and, as a result, greatly enhances autofocus capture times, image quality, and user experience.

The AD5823/AD5823-1 also incorporate a power-on reset circuit, which ensures that the DAC output powers up to 0 V and remains at 0 V until a valid write takes place. To ensure that minimal power is consumed in shutdown mode, the user can select the power-down polarity: the AD5823 SHUTDOWN pin is active low; the AD5823-1 SHUTDOWN pin is active high.

The AD5823/AD5823-1 were designed for autofocus applications in camera modules, camera phones, digital still cameras, and camcorders.

The AD5823/AD5823-1 have many industrial applications, such as controlling temperature, light, and movement over the temperature range of −40°C to +85°C without derating.

a. AC SPECIFICATIONS

VDD = 2.3 V to 3.6 V, GND = 0 V, load resistance (RL) = 15 Ω connected to VDD, TMIN to TMAX, unless otherwise noted.

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
AC SPECIFICATIONS					
Output Current Settling Time		55		µs	L_L = 680 µH (in series with R_L), ¼ scale to ¾ scale change (0x100 to 0x300), settled to ±4 LSB accuracy
Slew Rate		1.4		mA/µs	
Major Code Change Glitch Impulse		0.15		nA-sec	1 LSB change around major carry
Digital Feedthrough		0.06		nA-sec	

b. I2C SERIAL INTERFACE SPECIFICATIONS

Parameter[1]	Limit at T_{MIN}, T_{MAX}	Unit	Description
f_{SCL}	400	kHz max	SCL clock frequency
t_1	2.5	µs min	SCL cycle time
t_2 (t_{HIGH})	0.6	µs min	SCL high time
t_3 (t_{LOW})	1.3	µs min	SCL low time
t_4 ($t_{HD, STA}$)	0.6	µs min	Start/repeated start condition hold time
t_5 ($t_{SU, DAT}$)	100	ns min	Data setup time
t_6 ($t_{HD, DAT}$)[1]	0.9	µs max	Data hold time
	0	µs min	
t_7 ($t_{SU, STA}$)	0.6	µs min	Setup time for repeated start
t_8 ($t_{SU, STO}$)	0.6	µs min	Stop condition setup time
t_9 (t_{BUF})	1.3	µs min	Bus-free time between a stop condition and a start condition
t_{10} (t_R)	300	ns max	Rise time of SDA when transmitting
	0	ns min	Rise time of SCL and SDA when receiving (CMOS compatible)
t_{11} (t_F)	0	ns min	Fall time of SDA when receiving (CMOS compatible)
	300	ns max	Fall time of SCL and SDA when receiving
	20 + 0.1 C_B	ns min	Fall time of SCL and SDA when transmitting
	300	ns max	Fall time of SDA when transmitting
C_B[2]	400	pF max	Capacitive load for each bus line

[1] A master device must provide a hold time of at least 300 ns for the SDA signal (referred to the minimum V_{IH} of the SCL signal) to bridge the undefined region of the falling edge of SCL.
[2] C_B is the total capacitance of one bus line in picofarads (pF); t_R and t_F measured between 0.3 × V_{DD} and 0.7 × V_{DD}.

Timing Diagram

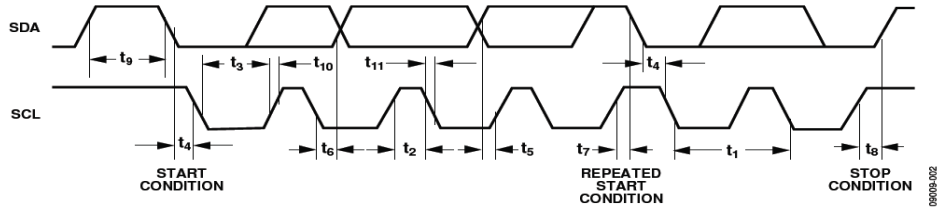
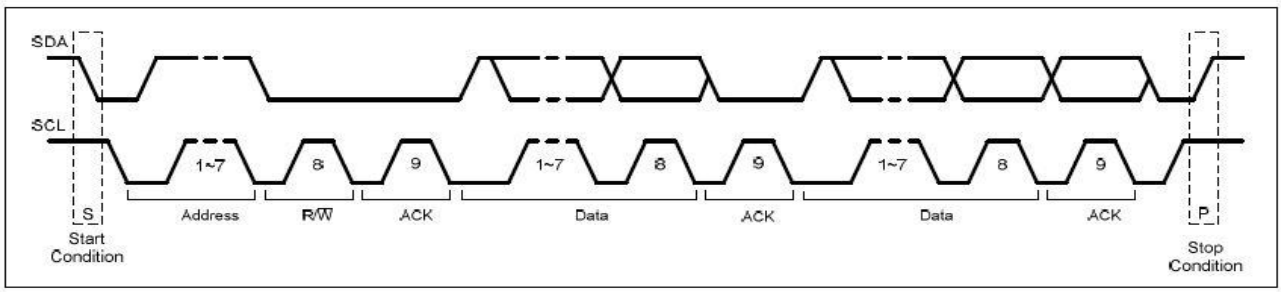


Figure 2. I²C Interface Timing Diagram

The AD5823 is controlled using the industry-standard I2C 2-wire serial protocol. Data can be written to or read from the DAC at data rates up to 400 kHz. After a read operation, the contents of the input register are reset to all zeros. The I2C address is 0x18h.

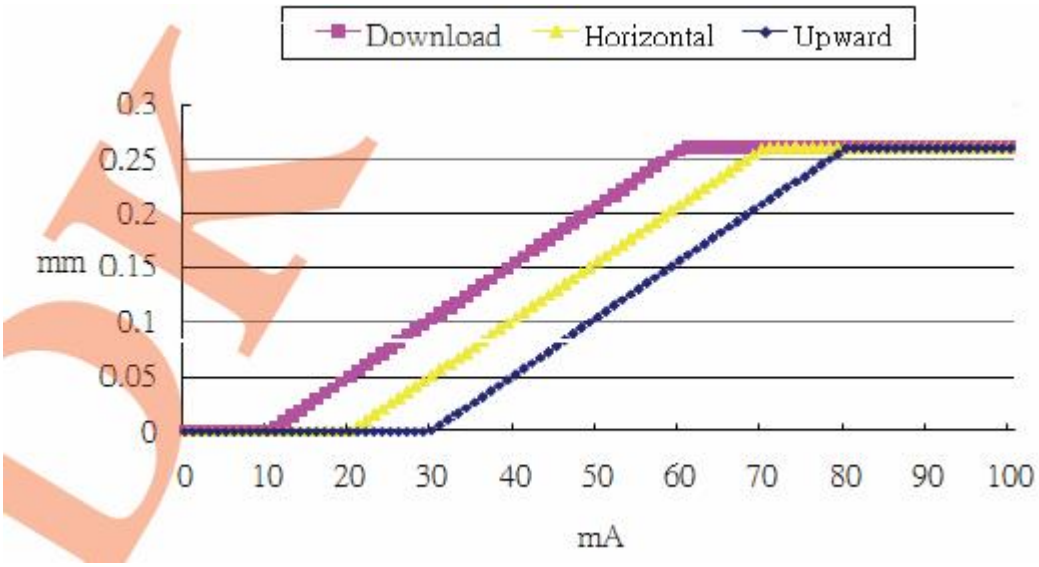


Complete I2C Data Transfer

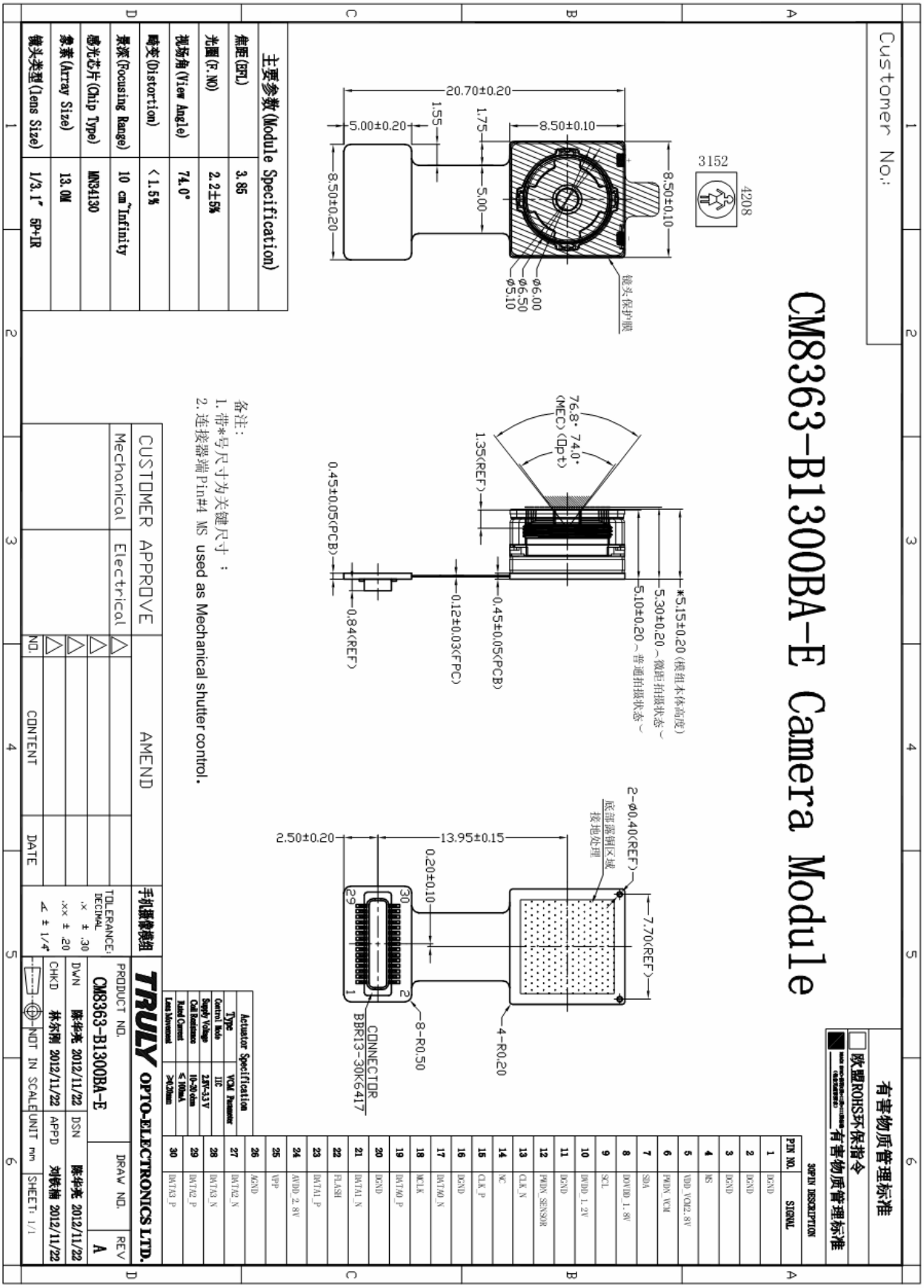
7. VCM Specification

NO.	Item	Condition	Specification
1	Motor Size	Without label & terminal	8.5×8.5×3.48 mm
2	Moving Tilt	0～0.26mm Optical Axis: +Z direction	≤12′
3	Sensitivity		≤9µm/mA
4	Starting Current	Optical Axis: +Z direction	15~452mA
5	Hysteresis	10~80~10mA(Step by 5mA)	≤±15µm
6	Rated Stroke	Under 80mA input current and optical axis is +Z	≥0.25mm
7	Lens Unit Weight	nominal	≤0.085g

Performance Diagram


Download
Horizontal
Upward
0.3
0.25
0.2
mm 0.15
0.1
0.05
0
0
10
20
30
40
50
60
70
80
90
100
mA

Mechanical Drawing



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; No feeling defect; 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	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
4	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
5	FPC/PCB	Edge defect limitation: width≤1/2H (H is minimum.)、length≤1mm、defect numbers per edge≤2(No tearing gap in by edge for FPC); Edge outshoots 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
6	Connector	No dust, fingerprint, and not allows to turning colors, distortion; Solder must be well; No open circuit or short circuit	A
7	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

8	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
9	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
10	Protective film	No dust in the glue side. Not allows floating or dropping.	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.

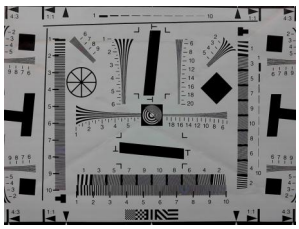
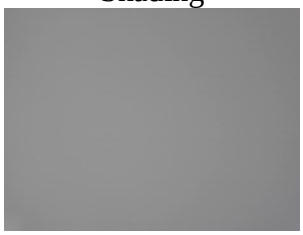
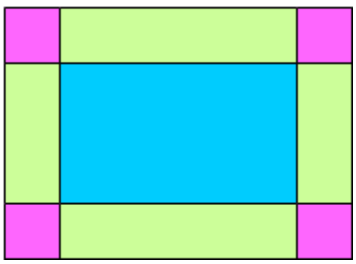
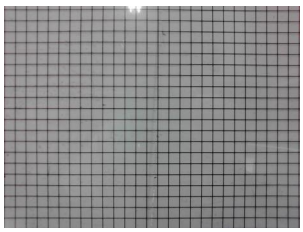
B：The defect can be found in the finished product and has visual difference from the good one, but will not affect customer's aesthetic judgment. Or the defect can not be found in the finished product and will not generate functional problem, but will slightly influence sequential manufacture process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

C：Check method:distance 30cm, visual vertical or 45°reflection.

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 	TBD	A
2	Shading 	TBD	A
3	Blemish 	For center area | Yi - YAvg. | < 5% x YAvg. For green color area | Yi - YAvg. | < 7% x YAvg. For corner area | Yi - YAvg. | <10% x YAvg. Blemish number≤1 Blemish define： size≧8 x 8 pixel size	B
4	Distortion 	＜1%	B

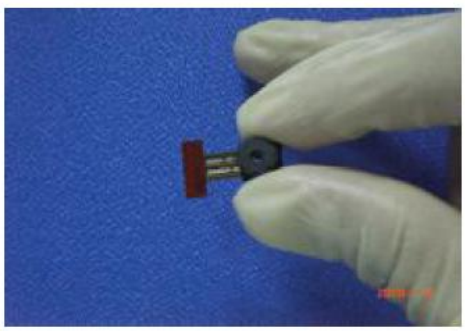
Reliability Specification

No.	Test item	Test condition	Judgment
1	Temperature strike cycle [Power off]	Low temperature:-30°C±2℃ for 30 min High temperature:+80°C±2℃ for 30 min Cycle:10 times	1.Function: Resolution: difference<20% after test Shading: difference<20% after test 2.Appearance: Do not exit NG after test
2	High temperature and high humidity storage	Temperature:60°C Humidity:90%RH Time:96 hours	
3	Low temperature operating	Temperature:-20°C±2℃ Time:96 hours	
4	High temperature operating	Temperature:70°C±2℃ Time:96 hours	
5	Low temperature storage	Temperature:-30°C±2℃ Time:96 hours	
6	High temperature storage	Temperature:80°C±2℃ Time:96 hours	
7	ESD test [Power off]	C:150pF R:330Ω Voltage:±2KV Air discharge: Cycle:10 times	
8	Vibration Test [Packaged]	Frequency:10Hz~55Hz~10Hz Amplitude:1.5 mm Times: each X,Y,Z directions for 30mins	
9	Dropping test [Packaged]	Product dropping from 150cm height to smooth marble Drop style:1 corner,3 arris,6 faces Test times:10	

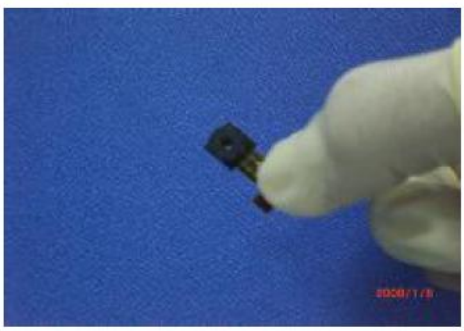
Precautions for Using CCM Modules

Handing Precautions

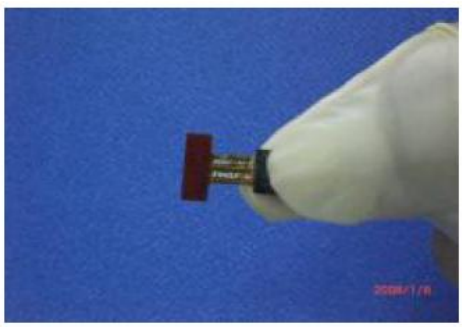
—DO NOT try to open the unit enclosure as there is no user-serviceable component inside. To prevent damage to the camera module by electrostatic discharge, handling the camera module only after discharging all static electricity from yourself and ensuring a static-free environment for the camera module.
—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 speculate 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.



Correct



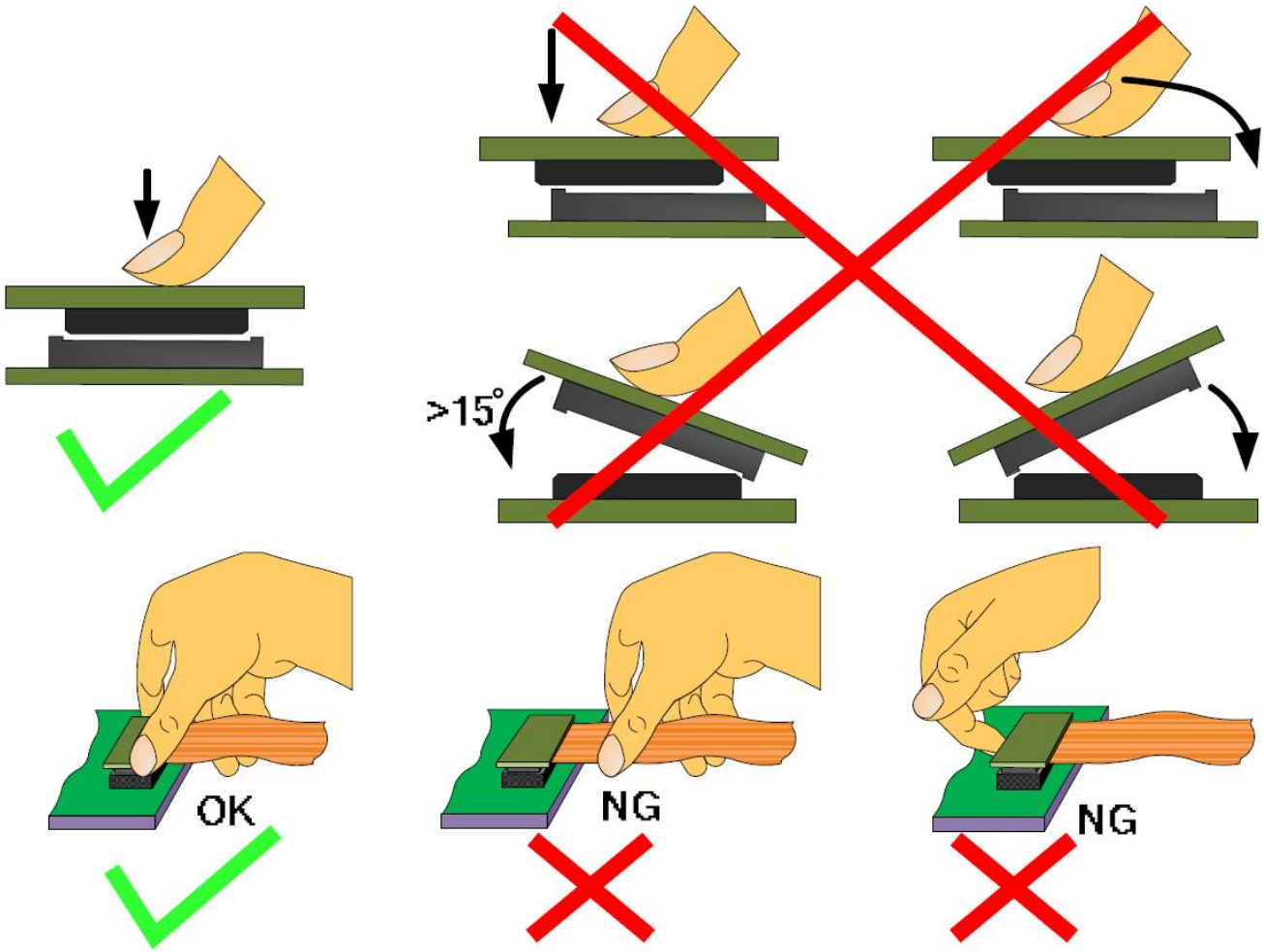
Incorrect



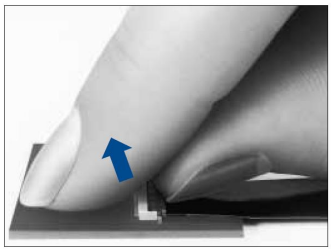
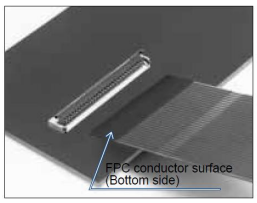
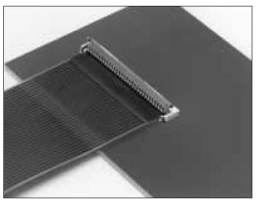
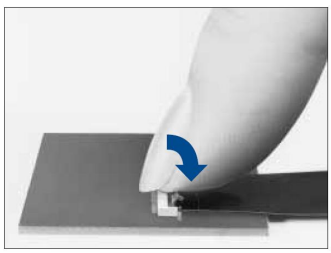
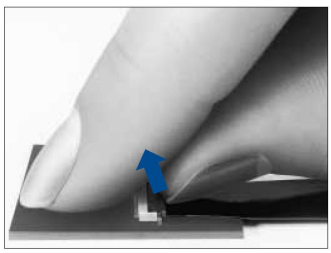
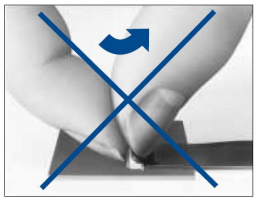
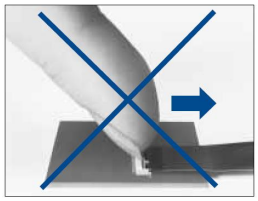
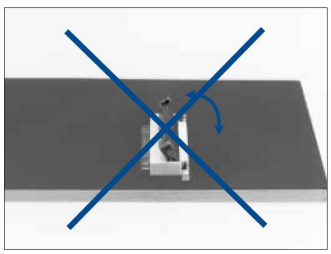
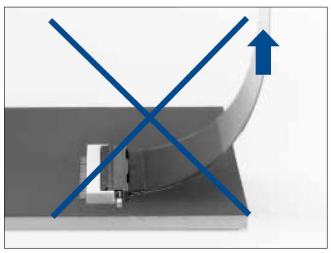
Incorrect

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

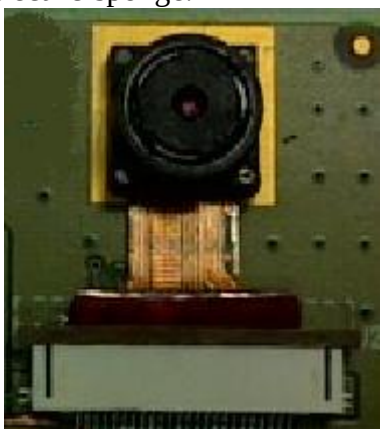


Precaution for assemble the module with ZIF connector:

Operation	Precautions
1. FPC/FFC Termination procedure. Connector installed on the board. 1) Lift up the actuator. Use thumb or index finger.  2) Assure that the FPC/FFC is fully inserted parallel to mounting surface, with the exposed conductive traces facing down.   3) Rotate down the actuator until firmly closed. It is critical that the inserted FPC/FFC is not moved and remains fully inserted. Should the FPC/FFC be moved, open the actuator and repeat the process, starting with Step 1 above.  **2. FPC/FFC Removal** 1) Lift up the actuator. 2) Carefully remove the FPC/FFC. 	1) Do not apply excessive force or use any type of tool to operate the actuator.   2) The connector will assure reliable performance when the actuator is open to 130° maximum. Do not exceed this angle, as this may cause permanent damage to the connector.  3) Application of excessive force to the inserted FPC/FFC may cause damage to connector and may affect the reliability of electrical connection. If specific application requires continuous or repeated pull or bend of the inserted FPC/FFC, assure that the forces are NOT transmitted directly to the connector. 

Precaution for assembling the module to terminal unit

The temperature of running module is high base on the high-integrated sensor. In order to enhance the heat dissipation and reduce the noise infection from high temperature, TRULY recommend that the module's backside should be touched with rigid material directly, like as PCB or metal. If necessary, it's recommended the module backside is affixed with the materials which can transfer heat, like as electric-fabric, electric-adhesive, or electric-sponge.



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 being 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 turn-up.
-FPC is lacerated or discon-nexion, and so on.

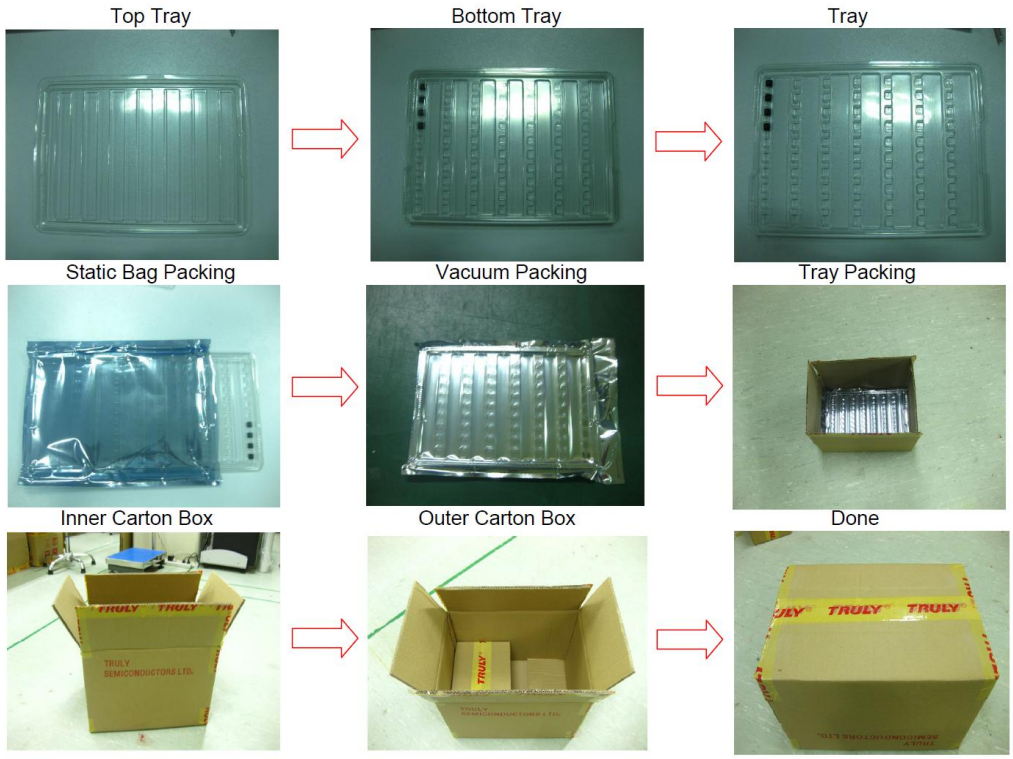
Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet, conductors and terminals.

Package Specification

Packaging Design One

Product No.	CM8363-B1300BA-E	Release date	
Product name	Compact Camera Module	Releaser	
Supplier	TRULY OPTO-ELECTRONICS LTD.	Recycle	☐YES ■ NO
Quantity/ 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		

Packing Standards:



There are TBD modules each plastic plate.

There are TBD modules each inner carton box.

There are 4 inner carton boxes in each outer carton box.

Requirements of outer carton box :

1. Weight(Max): 0.75 Kg
2. Height (Max): 0.29 M
3. Prohibition: Box made by log

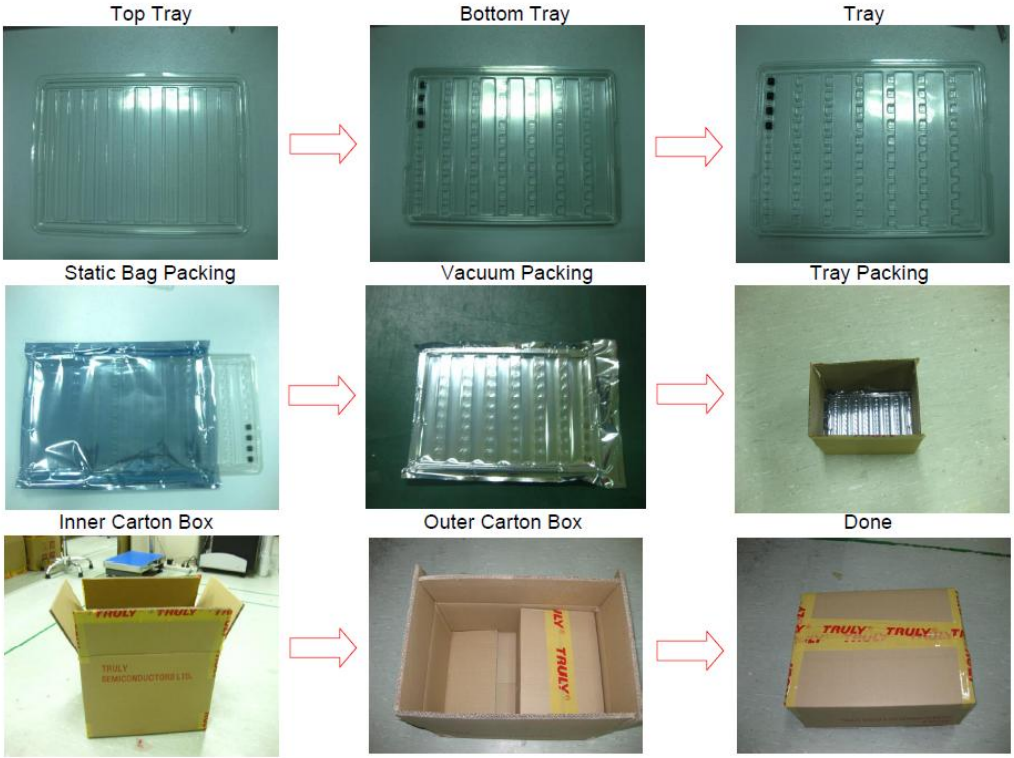
Material for Plastic tray

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

Packaging Design Two

Product No.	CM8363-B1300BA-E	Release date	
Product name	Compact Camera Module	Releaser	
Supplier	TRULY OPTO-ELECTRONICS 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		

Packing Standards:



There are TBD modules each plastic plate.

There are TBD modules each inner carton box.

There are 2 inner carton boxes in each outer carton box.

Requirements of outer carton box :

4. Weight(Max): 0.65 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 OPTO-ELECTRONICS LTD.
FACTORY ADDRESS: Truly Industrial Area, Shanwei City, Guangdong, China
FACTORY PHONE: 86-0660-3380061 FAX: 86-0660-3371772