Specification for Approval

Customer:

Model Name: AM-320240-023B

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
Peter	Peng Jun		

Revision Record

REV NO.	REV DATE	CONTENTS	Note
A	2016-01-04	NEW ISSUE	
B	2016-03-29	Change the B/L	
C	2016-05-12	Change the B/L	
D	2019-08-22	Change the B/L	

Table of Contents

1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by AMSON electronics.

If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution.

2. General Information

ITEM	STANDARD VALUES	UNITS
LCD type	2.3"TFT	--
Dot arrangement	320(RGB)×240	dots
Color filter array	RGB vertical stripe	--
Display mode	TN / Transmission / Normally White	--
Viewing Direction	12 o'clock	--
Driver IC	ILI9342C	--
Module size	50.90(W)×45.80(H)×2.45(T)	mm
Active area	46.75(W)×35.06(H)	mm
Dot pitch	0.1461 (W)×0.1461 (H)	mm
Interface	4-line SPI	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	4 White LED	--
Weight	TBD	g

3. External Dimensions

NOTES:
1. Display Type:a-Si TFT;
2. Backlight:4-chips LED,series;
3. View Direction:12H;
4. Driver IC:ILI9342C
5. General Tolerance:±0.3;
6. Recommended Case Open Area should be less than Module V.A;
7. Recommended Connector:
8. REQUIREMENTS ON ENVIRONMENTAL PROTECTION: RoHS

45.80±0.2
41.66
36.26(LCD V.A)
35.06(LCD A.A)
18.10
1.85
2.45

21.75
0.50
7.50±0.1
P0.5*13=6.50
W=0.30

7.00
4.00

2.3" TFT
320*3(RGB)*240 DOTS
VIEWING DIRECTION

50.90±0.2
49.75
47.95(LCD V.A)
46.75(LCD A.A)
1.47
2.07

0.30±0.05
FPC+PI

2.45±0.1

5.00

LEDA

LEDK LEDK LEDK LEDK

背光电路图
(CIRCUIT DIAGRAM)

PIN	DESCRIPTION
1	NC
2	NC
3	NC
4	NC
5	NC
6	GND
7	VDD
8	SDA
9	SCL
10	CD
11	RESET
12	CS
13	LEDA
14	LEDK

SYM.	DESCRIPTION OF REVISION	REASON	REVISED BY	DATE
A	first issue		XG.SU	2015/8/4
B	Change the B/L		XG.SU	2016/3/29
C	Change the B/L		XG.SU	2016/5/5
D	Change the B/L		XG.SU	2019/6/3

TITLE: OUTLINE DIMENSION

于都上晴电子有限公司
YU DU AMSON ELECTRONICS Co.,Ltd.

	BY:			
DRAWN	BY:	D/N: AM-320240-023B		
CHECKED	BY:	Rev:D		
APPROVED	BY:	SCALE: 1:1	SHEET NO. 1 OF 1	UNIT: mm

4. Interface Description

Pin	Symbol	Description.
1	NC	No connection
2	NC	No connection
3	NC	No connection
4	NC	No connection
5	NC	No connection
6	GND	Power ground
7	VDD	Analog Supply Voltage
8	SDA	Serial input signal in SPI I/F
9	SCL	Display data / command selection in 80-series MPU I/F A synchronous clock signal in SPI I/F
10	RS	Data enable signal in SPI
11	RESET	Reset pin. Initializes the IC,when this signal is low. Must be reset after power is stable.
12	CS	Input pin for chip selection signal
13	LEDA	LED backlight (Anode)
14	LEDK	LED backlight (Cathode)

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Logic Supply Voltage	IOVCC	-0.3	2.7	V
Analog Supply Voltage	VDD	-0.3	4.0	
Input Voltage	VIN	GND-0.3	5.0	V
Operating Temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	°C
Storage Humidity	HD	--	90	%RH

6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Logic Supply Voltage	IOVCC	1.65	2.8	3.3	V	
Power Supply Voltage	VDD	2.5	2.8	3.3	V	-
Input High Voltage	V_{IH}	0.7VDD	--	VDD	V	Digital input pins
Input Low Voltage	V_{IL}	GND	--	0.3VDD	V	Digital input pins
Output High Voltage	V_{OH}	0.8VDD	--	VDD	V	Digital output pins
Output Low Voltage	V_{OL}	-1	--	-	V	Digital output pins
I/O Leak Current	I_{LI}	-0.1	--	0.1	uA	-

7. Timing Characteristics
7.1 Display Serial Interface Timing Characteristics (4-line SPI system)
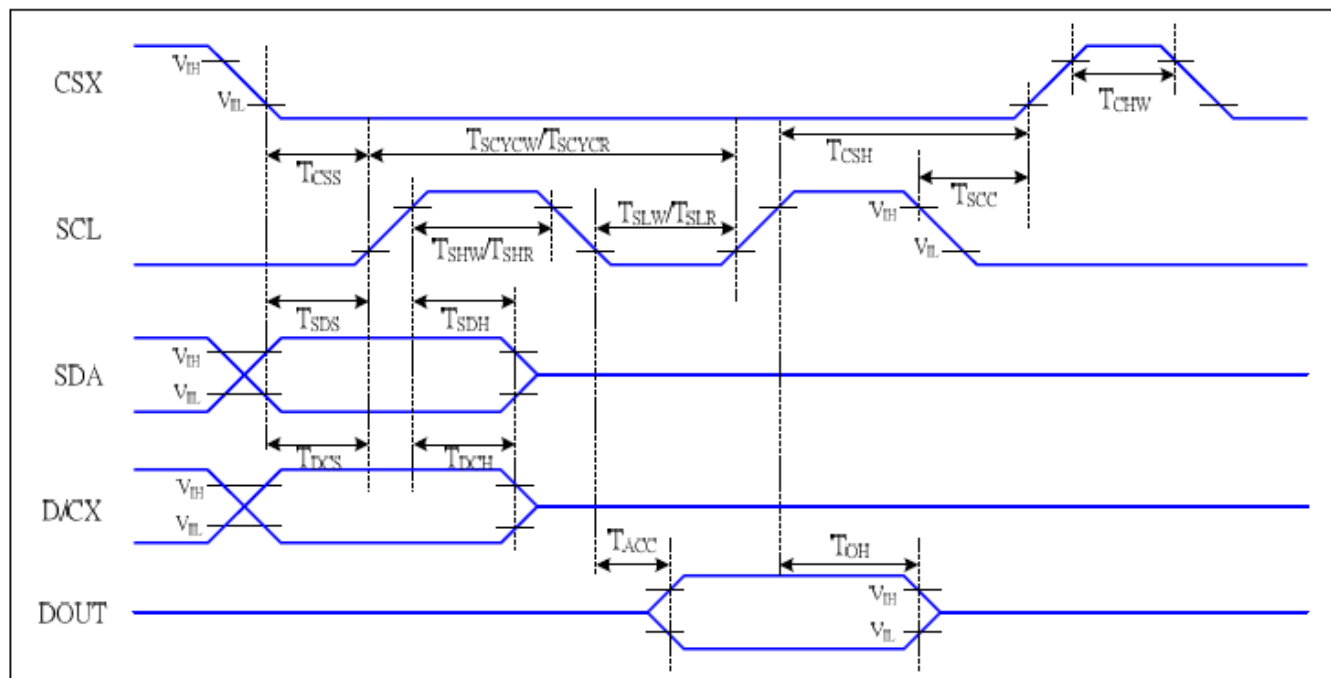
Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	-write command & data ram
	T_{SHW}	SCL "H" pulse width (Write)	15		ns	
	T_{SLW}	SCL "L" pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	-read command & data ram
	T_{SHR}	SCL "H" pulse width (Read)	60		ns	
	T_{SLR}	SCL "L" pulse width (Read)	60		ns	
D/CX	T_{DCS}	D/CX setup time	10		ns	
	T_{DCH}	D/CX hold time	10		ns	
SDA (DIN)	T_{SDS}	Data setup time	10		ns	
	T_{SDH}	Data hold time	10		ns	
DOUT	T_{ACC}	Access time	10	50	ns	For maximum CL=30pF
	T_{OH}	Output disable time	15	50	ns	For minimum CL=8pF

7.2 Reset Timing Characteristics
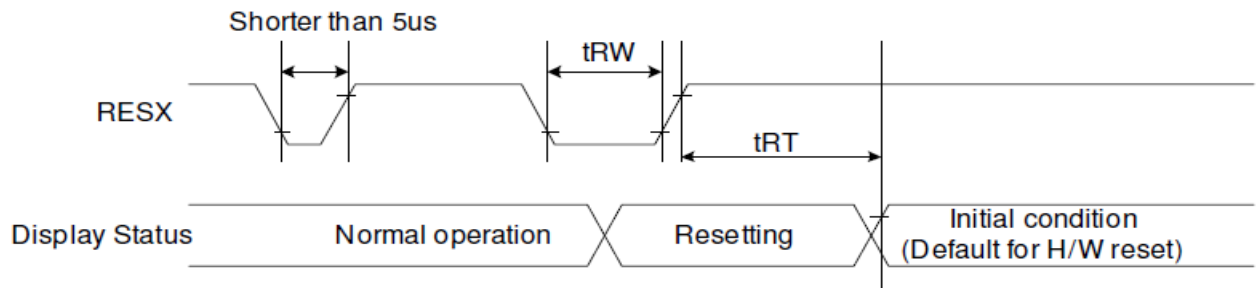
| Signal	Symbol	Parameter	Min	Max	Unit
RESX	tRW	Reset pulse duration	10		uS
	tRT	Reset cancel		5 (note 1,5)	mS
				120 (note 1,6,7)	mS

Note 1: The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NV memory to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

Note 2: Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below: -

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 10us	Reset
Between 5us and 10us	Reset starts

Note 3: During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In -mode.) And then return to Default condition for Hardware Reset.

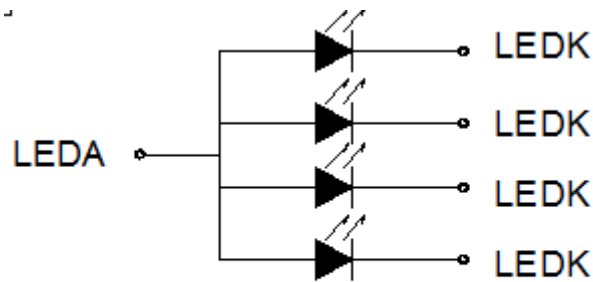Note 4: Spike Rejection also applies during a valid reset pulse as shown below:
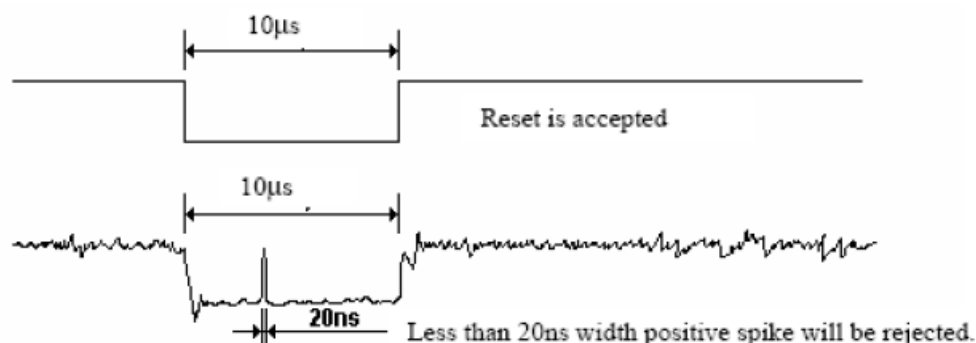
Note 5: When Reset applied during Sleep In Mode.

Note 6: When Reset applied during Sleep Out Mode.

Note 7: It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

## 8. Backlight Characteristics

背光电路图
(CIRCUIT DIAGRAM)

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	3.0	3.2	--	V	If=80mA
Supply Current	If	--	80	--	mA	--
Luminous Intensity for LCM	--	250	300	--	Cd/m^2	If=80mA
Uniformity for LCM	--	80	--	--	％	If=80mA
Life Time	--	--	50000	--	Hr	If=80mA
Backlight Color	White					

9. Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Transmittance		T	--	--	--	--	%	--
Contrast Ratio		CR	--	--	500	--	--	Note3
Response Time		Tr+Tf	25°C	--	16	28	ms	Note4
Viewing Angle	3H	θ3H(R)	CR≥10	--	45	--	--	Note5
	9H	θ9H(L)		--	45	--	--	
	6H	φ6H(D)		--	50		--	
	12H	φ12(U)		--	20	--	--	
Color Filter Chromaticity	White	x	θ=φ=0°	--	TBD	--	--	Note6
		y		--	TBD	--	--	
		λ		--	TBD	--	--	
	Red	x	θ=φ=0°	--	TBD	--	--	
		y		--	TBD	--	--	
		λ		--	TBD	--	--	
	Green	x	θ=φ=0°	--	TBD	--	--	
		y		--	TBD	--	--	
		λ		--	TBD	--	--	
	Blue	x	θ=φ=0°	--	TBD	--	--	
		y		--	TBD	--	--	
		λ		--	TBD	--	--	

Note1.Ambient condition: 25°C±2°C, 60±10%RH, under 10 Lux in the darkroom.

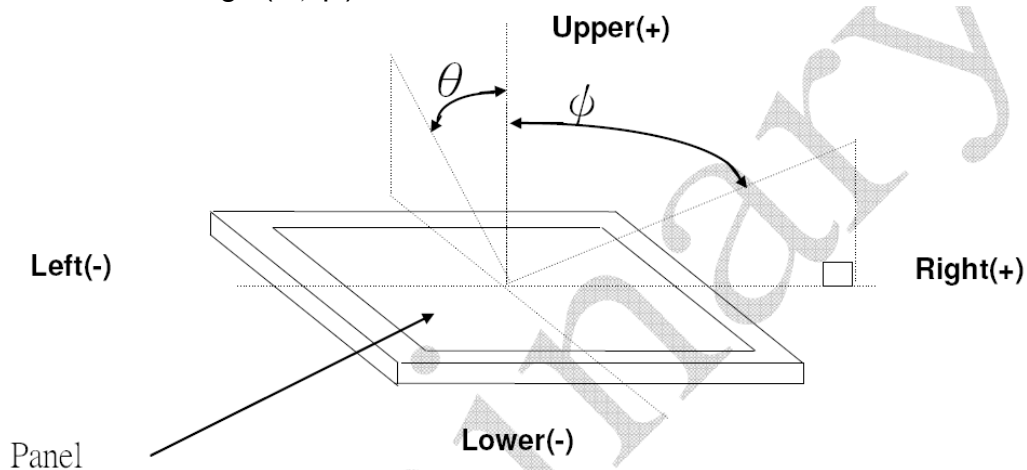Note2.Measure device: BM-5A (TOPCON), viewing cone=1°, IL=80mA.
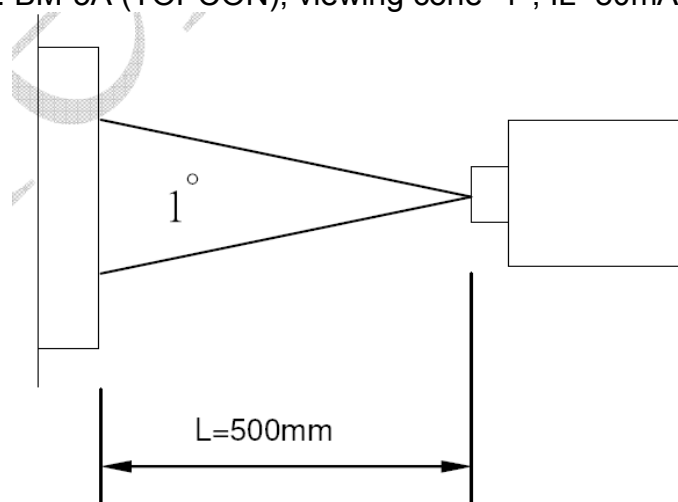
Note3. Definition of Contrast Ratio：
    CR = White Luminance (ON) / Black Luminance (OFF)

Note4. Definition of response time：The response time is defined as the time interval between the 10% and 90% amplitudes.
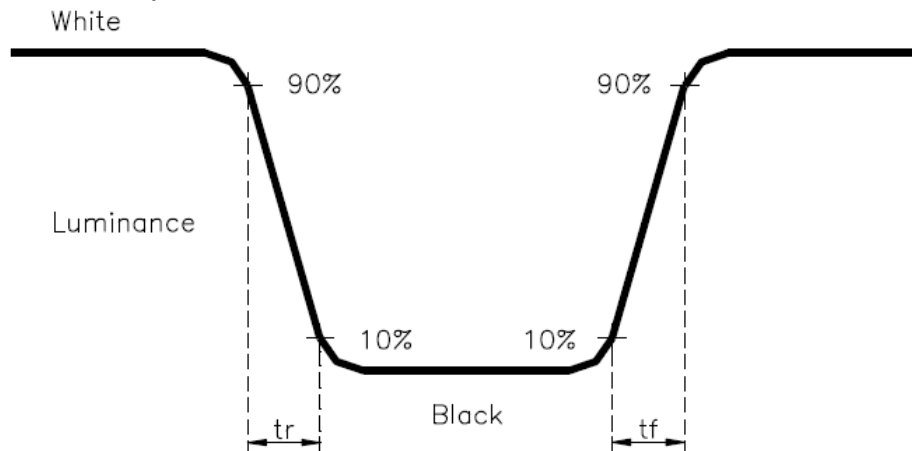
Note5. Definition of view angle(θ, φ)：

Note6. Light source: C light.

10. Reliability Test Conditions and Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80°C±2°C×200Hours	Inspection after 2~4hours storage at room temperature, the samples should be free from defects: 1, Air bubble in the LCD. 2, Seal leak. 3, Non-display. 4, Missing segments. 5, Glass crack. 6, Current IDD is twice higher than initial value. 7, The surface shall be free from damage. 8, The electric characteristic requirements shall be satisfied.
②	Low Temperature Storage	-30°C±2°C×200Hours	
③	High Temperature Operating	70°C±2°C×120Hours	
④	Low Temperature Operating	-20°C±2°C×120Hours	
⑤	Temperature Cycle(Storage)	-20°C ⟺ 25°C ⟺ 70°C (30min) (5min) (30min) 1cycle Total 10cycle	
⑥	Damp Proof Test (Storage)	50°C±5°C×90%RH×120Hours	
⑦	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5M X,Y,Z direction for total 3hours (Packing Condition)	
⑧	Drooping Test	Drop to the ground from 1M height one time every side of carton. (Packing Condition)	
⑨	ESD Test	Voltage:±8KV,R:330Ω,C:150PF,Air Mode,10times	

REMARK:
1, The Test samples should be applied to only one test item.
2, Sample side for each test item is 5~10pcs.
3, For Damp Proof Test, Pure water(Resistance＞10MΩ)should be used.
4, In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
5, EL evaluation should be accepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
6, Failure Judgment Criterion: Basic Specification Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

11. Handling Precautions

11.1 Mounting method

The LCD panel of AMSON TFT module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

11.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent
[Recommended below] and wipe lightly
- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:
- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns
Do not use the following solvent on the pad or prevent it from being contaminated:
- Soldering flux
- Chlorine (CI) , Sulfur (S)

If goods were sent without being sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (CI), Sulfur (S) from customer, Responsibility is on customer.

11.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to VDD or GND, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

11.4 packing

- Module employs LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

11.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- Slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

11.6 storing

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.
  [It is recommended to store them as they have been contained in the inner container at the time of delivery from us.

11.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water.

12. Precaution for Use

12.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

12.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification.
- When a new problem is arisen this is not specified in this specification.
- When an inspection specifications change or operating condition change in customer is reported to AMSON TFT and some problem is arisen in this specification due to the change.
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

13. Packing Method
TBD