

PRODUCT SPECIFICATION

Product Name	S62F LORA Transceiver Module
Version	B
Doc No	901-12301
Date	Mar 24, 2020



AcSIP Technology Corp.

A wireless communication SiP Solution Provider

3F,-1 No.207,Fusing Rd., Taoyuan City,Taoyuan Dist.,Taoyuan City 33066, Taiwan(R.O.C)
T. +886 3 286-8388 F. +886 3 347-5000

www.acsip.com.tw

Document History

Date	Revised Contents	Revised By	Version
Jan 17 ,2020	Initial Version	PW	A
Mar 24 ,2020	Update supply current in Transmit mode	PW	B



1. Description

The AcSiP S62F transceiver features the LoRa™ long range modem that provides ultra-long range spread spectrum communication and high interference immunity whilst minimizing current consumption.

S62F can achieve a sensitivity of over -137dBm using a TCXO and the related bill of materials @BW=125KHz & SF=12. The high sensitivity combined with the integrated +22 dBm Max. power amplifier yields industry leading link budget making it optimal for any application requiring range or robustness. LoRa™ also provides significant advantages in both blocking and selectivity over conventional modulation techniques, solving the traditional design compromise between range, interference immunity and energy consumption.

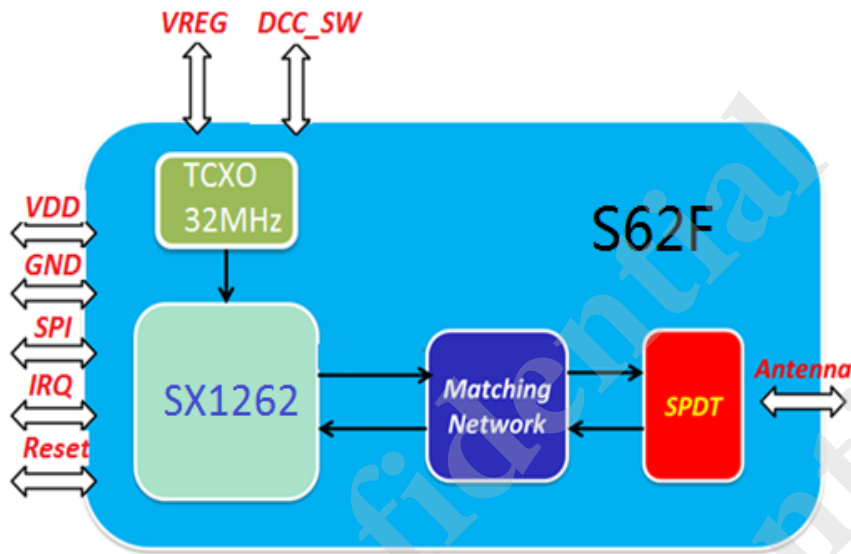
Feature

- Small footprint : 9 mm x 8 mm x 1.1 mm
- LoRa Transceiver Module , +22 dBm Max. RF output power
- Programmable bit rate up to 62.5 kbps LoRa
- Programmable bit rate up to 300 kbps FSK
- High sensitivity: down to -137 dBm @BW=125KHz ,SF=12
- Embedded TCXO of 32MHz



1-1. Block Diagram

A simplified block diagram of the S62F module is depicted in the figure below.



1-2. Product Version

The features of S62F is detailed in the following table

Part Number	Frequency Range	Spreading Factor	Bandwidth	Sensitivity
S62F	865MHz - 928MHz	5 ~ 12	7.8 - 500 kHz	< -137 dBm @BW=125KHz ,SF=12

1-3. Specification

Model Name	S62F
Product Description	LoRa Transceiver Module
Network Standard	Suitable PHY for LoRaWAN
Host Interface	SPI
Operation Conditions	
Temperature	<ul style="list-style-type: none"> ■ Storage : -50°C ~ +125°C ■ Standard Operating : -40°C ~ +85°C ■ Low TX Duty cycle : -40°C ~ +95°C
Humidity	<ul style="list-style-type: none"> ■ Operating : 10 ~ 95% (Non-Condensing) ■ Storage : 5 ~ 95% (Non-Condensing)
Dimension	9 mm x 8 mm x 1.1 mm
Package	LGA type

2. Electrical Characteristics

2-1. Absolute Maximum Ratings

Symbol	Parameter	Min.	Typ.	Max.	Unit
VDD	Supply Voltage	-0.5		3.9	V
Pmr	RF Input Level			+10	dBm

2-2. Recommended Operating Range

Symbol	Parameter	Min.	Typ.	Max.	Unit
VDD	Supply Voltage	2.4	3.3	3.7	V
Top	Temperature under bias	-40		85	°C

Note: VDD 3.3V for +22dBm Max., VDD 2.7 V for +20dBm Max., VDD 2.4 V for +19dBm Max.

2-3. Power Consumption Specification

Symbol	Parameter	Conditions	Typ.	Max.	Unit
IDDSL	Supply current in Sleep mode		0.6	2	μA
IDDST	Supply current in Standby mode	XOSC ON	0.8		mA
IDDFS	Supply current in Synthesizer mode	FSRx	3.55		mA
IDDR	Supply current in Receive mode	RX Bootsted	10.1		mA
IDDT	Supply current in Transmit mode	+ 22 dBm	120	138	mA
		+ 20 dBm	105		
		+ 17 dBm	93		

2-4. RF Characteristics

2-4-1. Electrical Specifications

The electrical specifications are given with the following conditions unless otherwise specified:

- VDD = 3.3 V
- Temperature = 25 °C
- FRF = 868/915 MHz
- RF impedances matched
- Transmit mode output power defined into a 50 ohm load impedance
- FSK BER = 0.1%, 2-level FSK modulation without pre-filtering, BR = 4.8 kb/s, FDA = ± 5 kHz, BW_F = 20 kHz double-sided
- LoRa® PER = 1%, packet 64 bytes, preamble 8 symbols, CR = 4/5, CRC on payload enabled
- RX/TX specifications given using default RX gain step and direct tie connection between Rx and Tx

2-4-2. Receive Mode Specifications

Symbol	Description	Conditions	Min	Typ	Max	Unit
RXS_2FB	Sensitivity 2-FSK, RX Boosted gain, split RF paths for Rx and Tx, RF switch insertion loss excluded	BR_F = 0.6 kb/s, FDA = 0.8 kHz, BW_F = 4 kHz		-125		dBm
		BR_F = 1.2 kb/s, FDA = 5 kHz, BW_F = 20 kHz		-123		dBm
		BR_F = 4.8 kb/s, FDA = 5 kHz, BW_F = 20 kHz		-118		dBm
		BR_F = 38.4 kb/s, FDA = 40 kHz, BW_F = 160 kHz		-109		dBm
		BR_F = 250 kb/s, FDA = 125 kHz, BW_F = 500 kHz		-104		dBm
RXS_LB	Sensitivity LoRa, Rx Boosted gain, , split RF paths for Rx and Tx, RF switch insertion loss excluded	BW_L = 10.4 kHz, SF = 7		-134		dBm
		BW_L = 10.4 kHz, SF = 12		-148		dBm
		BW_L = 125 kHz, SF = 7		-124		dBm
		BW_L = 125 kHz, SF = 12		-137		dBm
		BW_L = 250 kHz, SF = 7		-121		dBm
		BW_L = 250 kHz, SF = 12		-134		dBm
		BW_L = 500 kHz, SF = 7		-117		dBm
CCR_F	Co-channel rejection, FSK			-9		dB
CCR_L	Co-channel rejection, LoRa	SF = 7		5		dB
		SF = 12		19	21	dB

Symbol	Description	Conditions	Min	Typ	Max	Unit
BI_F	Blocking immunity, FSK	BR_F = 4.8 kb/s, FDA = 5 kHz, BW_F = 20 kHz Offset = +/- 1 MHz Offset = +/- 2 MHz Offset = +/- 10 MHz		- 68 70 80		dB dB dB
BI_L	Blocking immunity, LoRa	BR_F = 4.8 kb/s, FDA = 5 kHz, BW_F = 20 kHz Offset = +/- 1 MHz Offset = +/- 2 MHz Offset = +/- 10 MHz		88 90 99		dB dB dB
FERR_L	Maximum tolerated frequency offset between transmitter and receiver, no sensitivity degradation, SF5 to SF12	All bandwidths, ±25% of BW		± 25%		BW
FERR_L	Maximum tolerated frequency offset between transmitter and receiver, no sensitivity degradation, SF10 to SF12	SF12 SF11 SF10	-50 -100 -200		-50 -100 -200	ppm ppm ppm



2-4-3. Transmit Mode Specifications

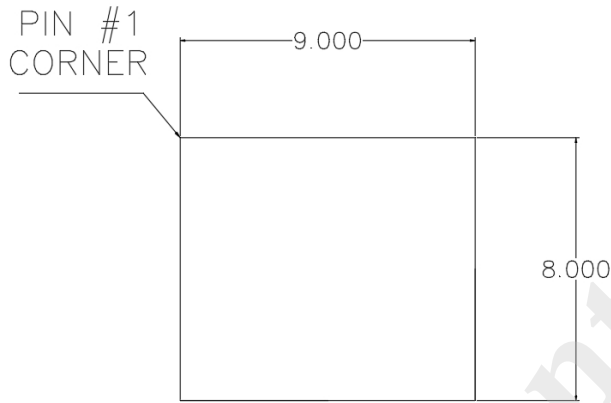
Symbol	Description	Conditions	Min	Typ	Max	Unit
TXOP	Maximum RF output power	Highest power step setting		+21	+22	dBm
TXDRP	RF output power drop versus supply voltage	SX1262, +22 dBm, VBAT = 2.7 V		2		dBm
		SX1262, +22 dBm, VBAT = 2.4		3		dBm
TXPRN	RF output power range	Programmable in 31 step	TXOP-31		TXOP	dBm
TXACC	RF output power step			± 2		dB
TXRMP	Power amplifier ramping	Programmable	10		3400	µs
TS_TX	Tx wake-up time	Frequency Synthesizer enabled		5 + PA ramping		ms

2-4-4. Digital I/O Specification

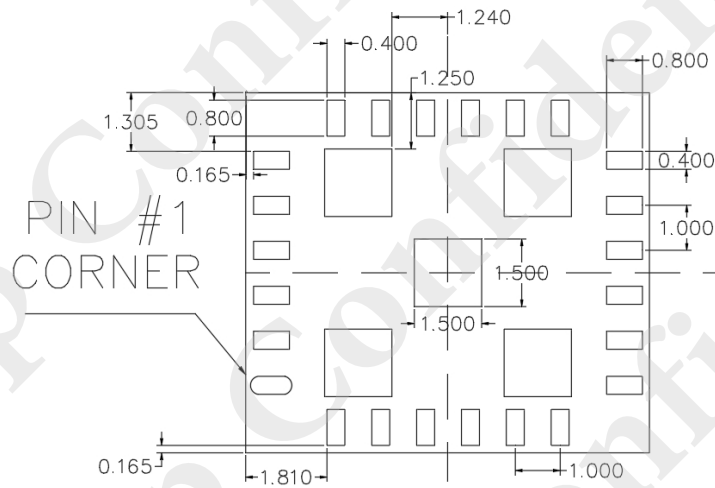
Symbol	Description	Conditions	Min	Typ	Max	Unit
V _{IH}	Input High Voltage		0.7*VDD		VDD+0.3	V
V _{IL}	Input Low Voltage		-0.3		0.3*VDD	V
V _{IL-N}	Input Low Voltage for pin		-0.3		0.2*VDD	V
V _{OH}	Output High Voltage	I _{max} = -2.5 mA	0.9*VDD		VDD	V
V _{OL}	Digital output level low	I _{max} = 2.5 mA	0		0.1*VDD	V
I _{leak}	Digital input leakage current (NSS, MOSI, SCK)				1	µA

Pin	Definition	I/O	Description
1	GND	-	Ground
2	VREG	I	Regulated voltage from the internal DC-DC
3	DCC_SW	O	DC-DC Switcher Output
4	VDD	I	Power supply
5	DIO1	I/O	Multi-purpose digital IO
6	BUSY	O	Busy indicator
7	NRST	I	Reset signal, active low
8	DIO2 /RF_Switch_Control	I/O	Multi-purpose digital I/O / RF Switch control
9	MISO	O	SPI slave output
10	MOSI	I	SPI slave input
11	SCK	I	SPI clock
12	NSS	I	SPI Slave Select
13	RF_VC1	I	DC control voltage / Active "H" Transmitter
14	GND	-	Ground
15	RF_ANT	I/O	RF Input / Output
16	GND	-	Ground
17	RF_VC2	I	DC control voltage / Active "H" Receiver
18	GND	-	Ground
19	GND	-	Ground
20	GND	-	Ground
21	GND	-	Ground
22	GND	-	Ground
23	GND	-	Ground
24	GND	-	Ground
25~29	EGND	-	Ground

3-2. Mechanical Dimensions



Top View



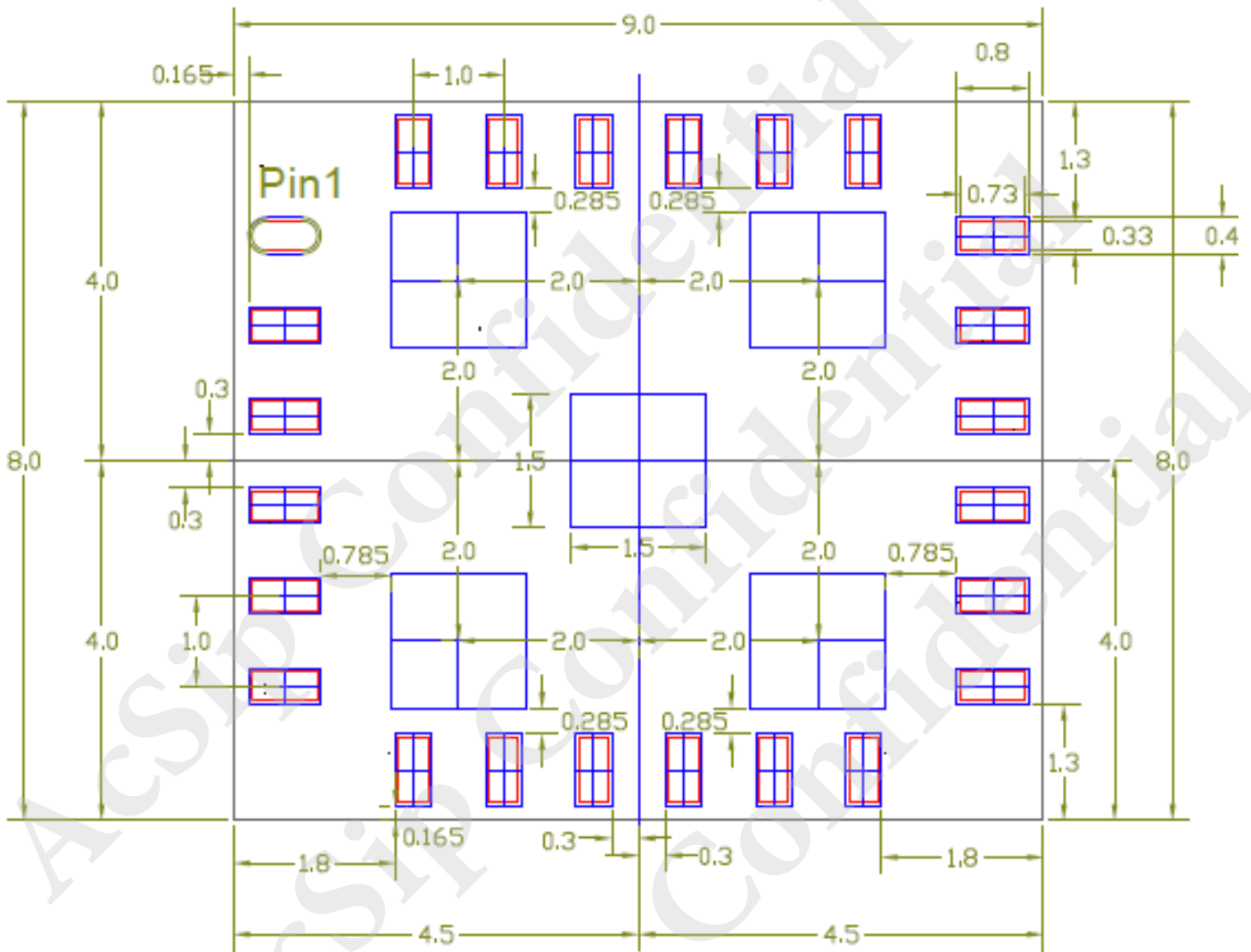
Bottom View



Side View

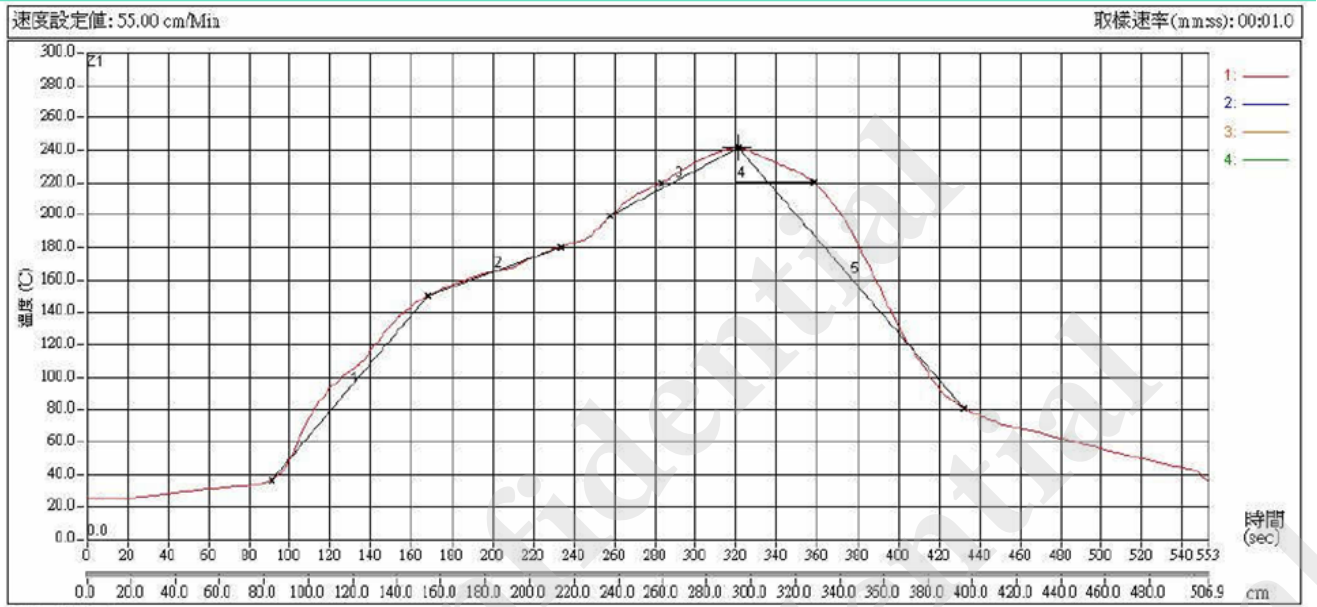


3-3 Recommended Footprint



Unit: mm

4. Recommended Reflow Profile



~ 150 °C < 2 °C/s	150 ~ 180 °C 55 ~ 65 sec	200°C ~ peak < 1 °C/s	above 220°C 65 ~ 75 sec	Peak Temp. 235~245 °C
1.47	65	0.66	75	241.5



5. Module Preparation

5-1. Handling

Handling the module, operator must wear the anti-static wrist strap to avoid ESD damage. After each module was aligned and tested, it should be transported and stored with anti-static tray and packing. This protective package must be remained in the suitable environment until the module is assembled and soldered onto the main board.

Base on reliability test result, Module passed MSL3 criterion.

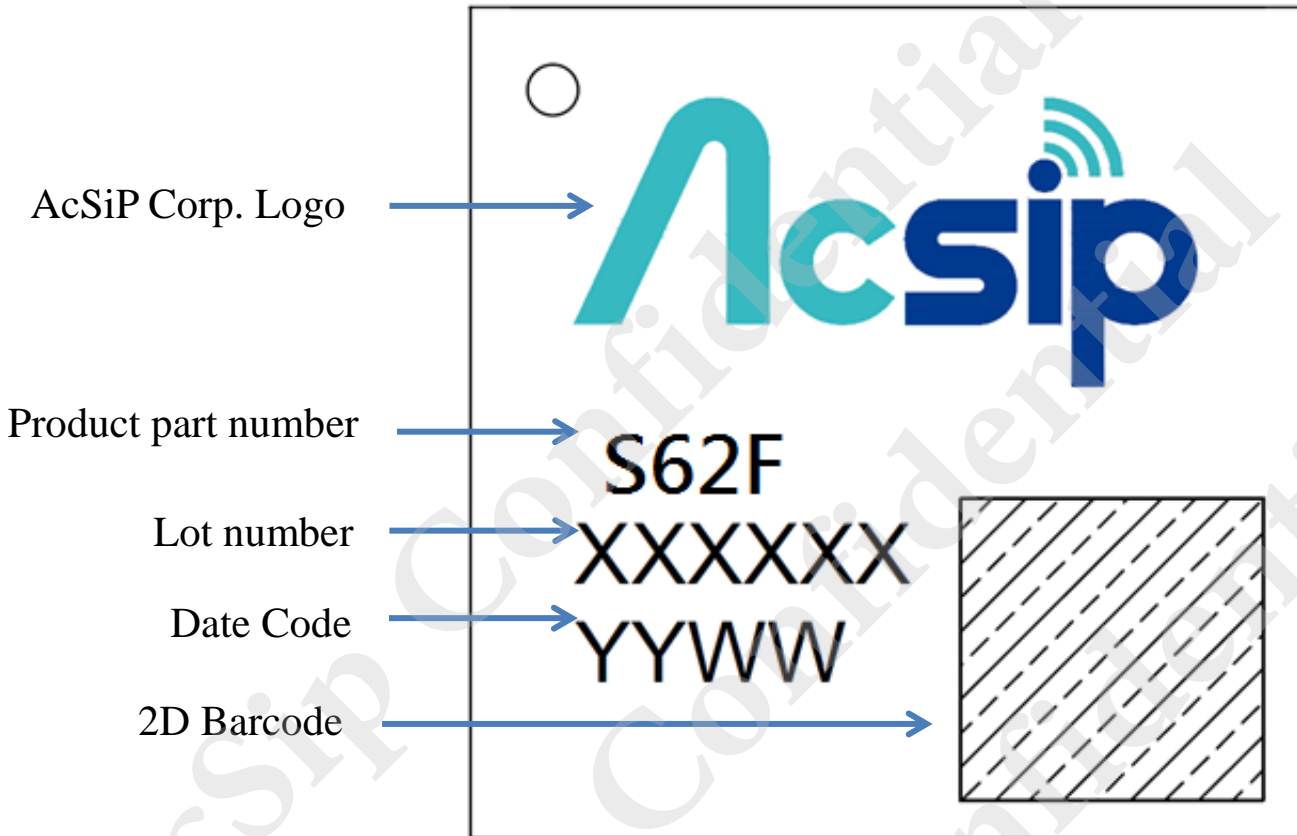
5-2. SMT Preparation

1. Calculated shelf life in sealed bag: 6 months at <40 degree and <90% relative humidity (RH).
2. Peak package body temperature: 250 degree.
3. After bag was opened, devices that will be subjected to reflow solder or other high temperature process must be
 - A. Mounted within: 168 hours of factory conditions <30 degree / 60% RH.
 - B. Stored at $\leq 10\%$ RH with N2 flow box.
4. Devices require baking, before mounting process, if:
 - A. Package bag does not be kept in vacuumed while first time opening.
 - B. Humidity Indicator Card is >10% when read at 23 ± 5 degree.
 - C. Exposed at 3A condition over 8 hours or Exposed at 3B condition over 24 hours.
5. If baking is required, devices should be baked for 12 hours at 125 ± 5 degree.



6. Package Information

6-1 Product Marking



6-2 Tray Dimension :

TBD

AcSip Confidential
AcSip Confidential
AcSip Confidential



6-3 Packing Information: TBD

1. 將產品放入托盤中
Put products into the tray.

2. 將托盤內產品按大小順序排列
Arrange products in the tray by size order.

3. 將托盤內產品按大小順序排列，並蓋上封套
Arrange products in the tray by size order and cover with a slip cover.

4. 將產品放入托盤中，並蓋上封套
Put products into the tray and cover with a slip cover.

5. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

6. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

7. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

8. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

9. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

10. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

11. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

12. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

13. 將產品放入托盤中，並蓋上封套，並蓋上封套
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14. 將產品放入托盤中，並蓋上封套，並蓋上封套
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15. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

16. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

17. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

18. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

19. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

20. 將產品放入托盤中，並蓋上封套，並蓋上封套
Put products into the tray and cover with a slip cover, and cover with a slip cover.

REVISION HISTORY			
REV	DESCRIPTION	RELEASED BY	DATE
1	Original	Josh	2014/12/10

TBD

NOTE:

1. 不要將產品放入托盤中，以免產品受損。
Do not put products into the tray to avoid damage.
2. 不要將產品放入托盤中，以免產品受損。
Do not put products into the tray to avoid damage.
3. 真空包裝後，請靜置 30 分鐘。
After vacuum packing, please wait for 30 minutes.

PROJECTIONS:

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN MM
ALL PROJECTIONS ARE THIRD ORDER

TOLERANCES:

LINEAR	ANGULAR
XXX ±	1°
XXX ±	
XXX ±	

APPROVALS:

APPROVALS	SIGN	DATE
DRAWING	Josh	2014/12/10
CHECKED	Kidd	2014/12/10
APPROVED	Jackson	2014/12/10

ACsIP HEADQUARTERS:
3F-1, No.207, Fusing Rd, Taysan City, Taysan Country, 330, TAIWAN, R.O.C.
TEL: 886-3-2668388 FAX: 886-3-3475000
TEL: 886-3-2668388 FAX: 886-3-3475000

CUSTOMER DRAWING NO: 207 3

TITLE: PACKING SPEC.
PACKING FOR M214

DWG NO: M214 PKG

REV: 01

SIZE: A4 **SCALE:** N/A **SHEET:** 1 of 1

6-4 Humidity Indicator Card



Indicates :
5%, 10%, 60% relative humidity

Color Change :
Brown (Dry) → Blue (Wet)