

## AK5707ECB Quality Data

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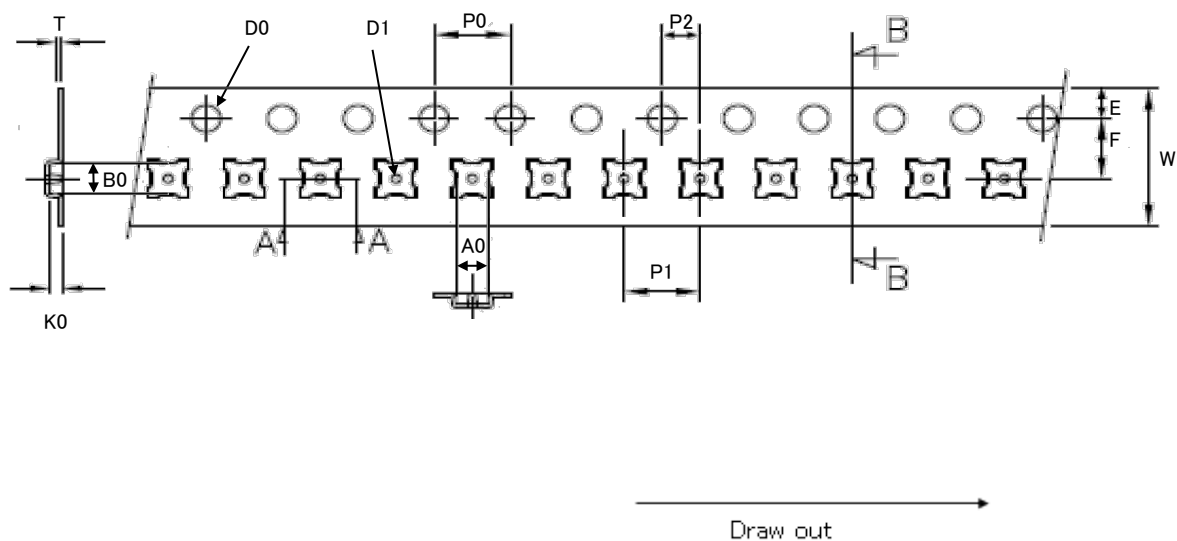
- \* The marking and dimensional drawings of our product described in this document (hereinafter referred to as the "Product") are shown in the datasheet of the Product. For any other information regarding Product not shown in this document, please make inquiries the sales office of us or authorized distributors.

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## EMBOSS TAPING PACKAGING SPECIFICATIONS (WLCSP—16pin)

### 1. Dimensions of Tape

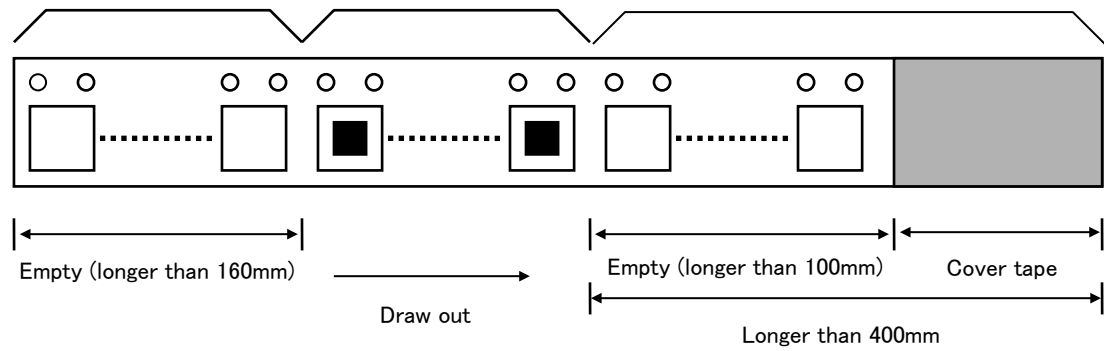


Unit:mm

A0	B0	W	E	F	P0*
1.67±0.05	1.72±0.05	8.00±0.30	1.75±0.10	3.50±0.05	4.00±0.10
P1	P2	D0(Φ)	D1(Φ)	K0	T
4.00±0.10	2.00±0.05	1.50+0.10/-0	0.50±0.05	0.65±0.05	0.25±0.03

\* Cumulative tolerance is 10 pitches at ± 0.20mm

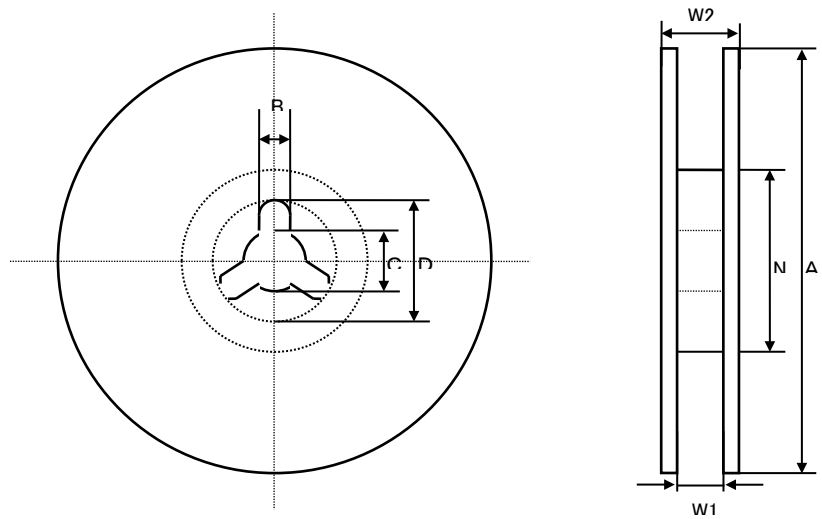
2. Tape at the leading and the ending portion



3. Tape at the joint

There's no jointing point at the cover tape and the carrier tape.

4. Specifications of the Reel

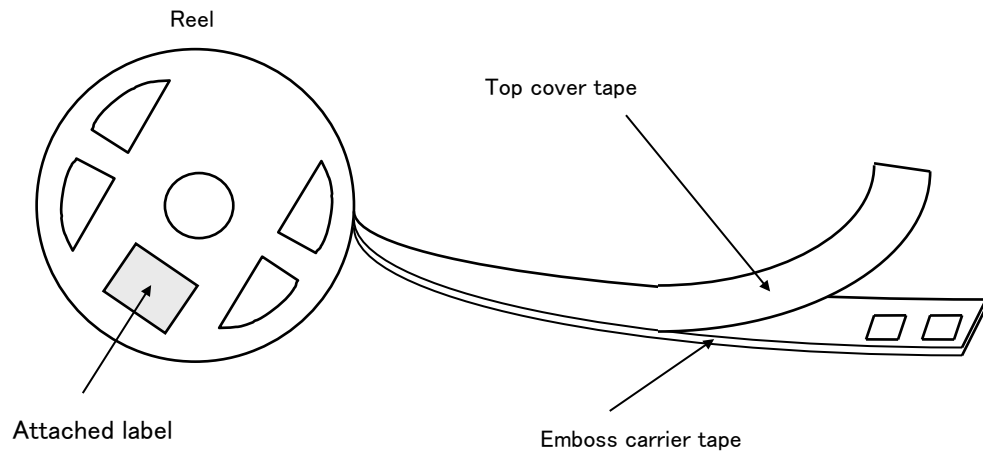


Unit:mm

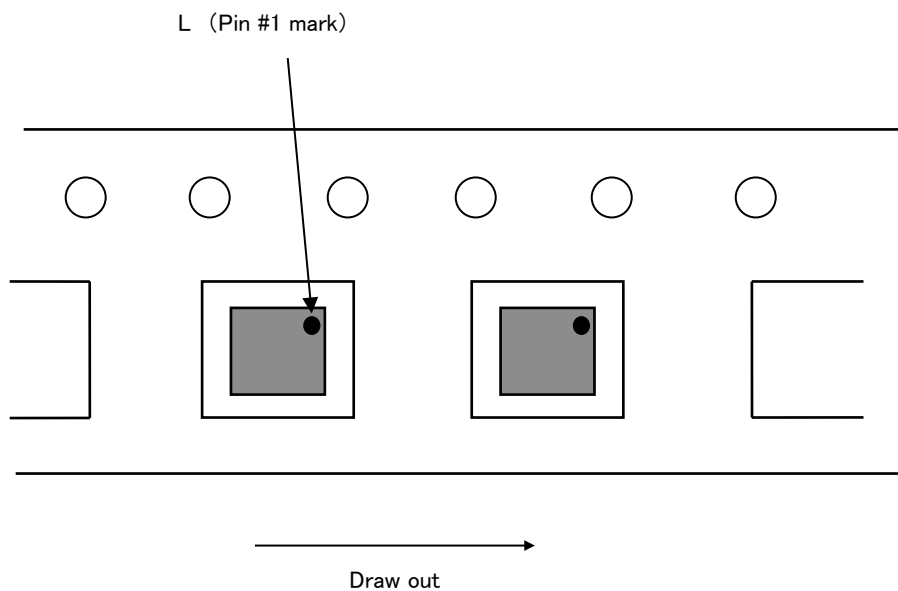
A	N	B	C	D	W1	W2
254±2.0	100±1.0	2±0.5	13.0±0.2	21±0.8	9.50±1.0	13.50±1.0

## 5. Taping

ICs are put in the pockets of an emboss carrier tape. Then, sealed with a cover tape and wound to a reel.



## 6. Taping direction

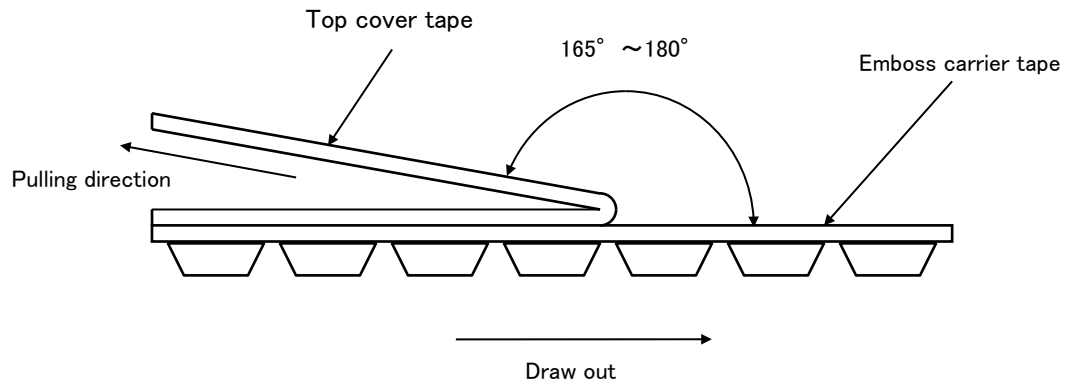


## 7. Exfoliation strength of cover tape

Exfoliation angle : 165~180 degree

Exfoliation speed : 300mm/min

Exfoliation strength : 0.1~1.0N



## 8. Number of lack ICs and mistaken taping

There must be no lack of products.

There must be no mistake in direction.

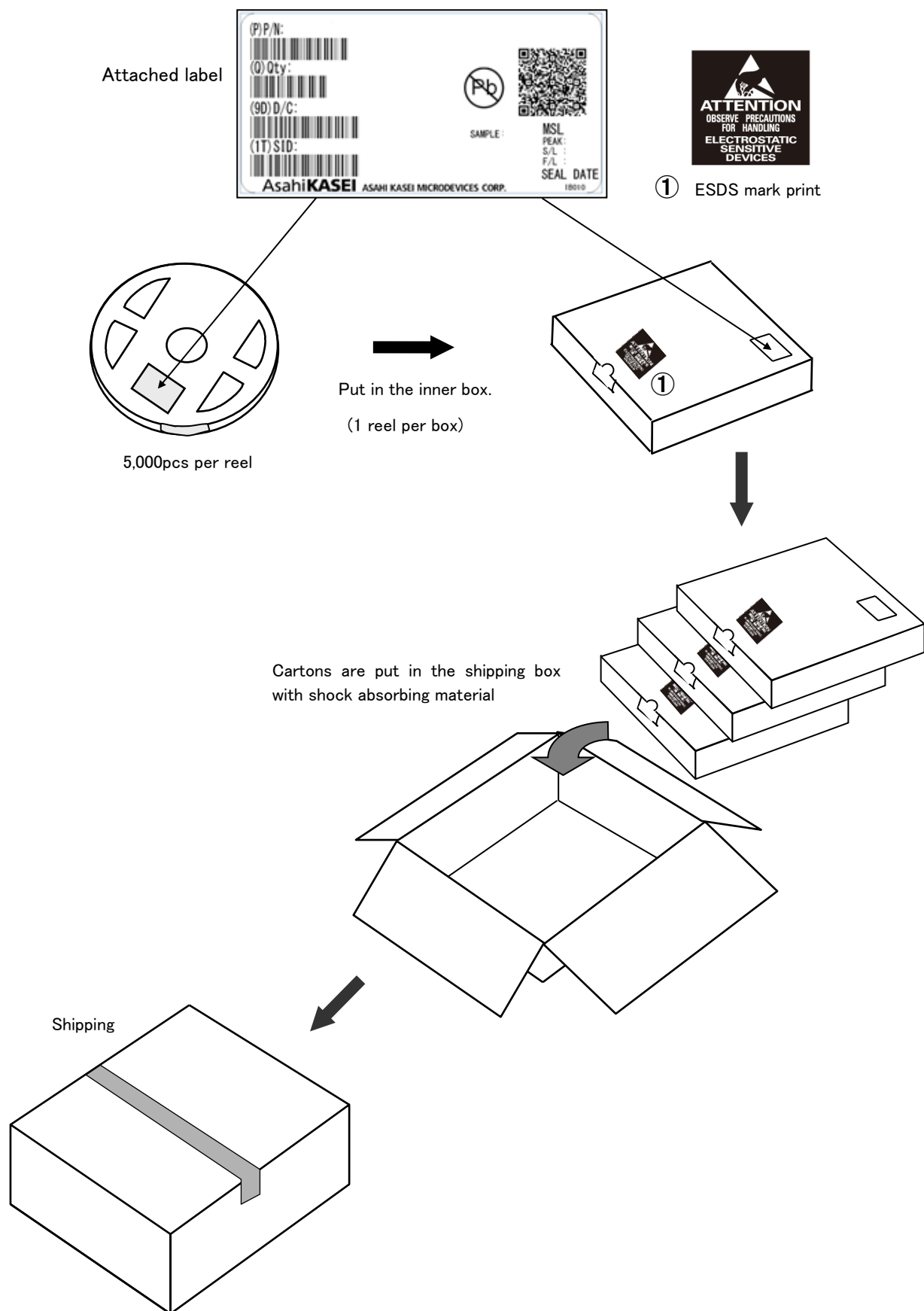
## 9. Caution for electro static discharge

Reel, Emboss carrier tape and top cover tape must be anti-static type.

## 10. Package and Indications

- Packaging is based on JEDEC J-STD-033.
- Quantity : 5,000pcs per reel
- The label which includes device type, quantity and lot# is attached on the reel and inner box.  
(2 lots at maximum can be combined. The 2 lots must have different data code)
- Reel is put inside the inner box. (No sealed in anti-static shield bag.)

Example of package and Indications



## AK5707ECB Reliability Test Data

WAFER PROCESS : CMOS

PACKAGE TYPE : S-UFBGA16-1.5677×1.5173-0.4

	TEST	CONDITION	S.S.	TEST RESULT MEASUREMENT TIME POINT / FAILURES				PASS-FAIL RESULT
1	HIGH TEMP. OPERATING LIFE	Tc=153°C DYNAMIC Vopr=Voprmax	80	$\frac{168}{0}$	$\frac{500}{0}$	$\frac{1000}{0}$	(h)	PASS
2	LOW TEMP. OPERATING LIFE	Ta=-40°C DYNAMIC Vopr=Voprmax	40	$\frac{168}{0}$	$\frac{500}{0}$	$\frac{1000}{0}$	(h)	PASS
3	REFLOW	BAKE: 125°C, 24h SOAKx1+REFLOWx3 85°C, 85%RH, 168h REFLOW: 260°C Max	218	ALL PASS				PASS
4	HIGH TEMP. STORAGE	(AFTER REFLOW TEST) Ta=150°C	40	$\frac{168}{0}$	$\frac{500}{0}$	$\frac{1000}{0}$	(h)	PASS
5	TEMP. CYCLING	(AFTER REFLOW TEST) Ta: -65~150°C SOAK: 30 min EACH	89	$\frac{100}{0}$	$\frac{200}{0}$	$\frac{500}{0}$	(CYCLE)	PASS
6	AUTOCLAVE	(AFTER REFLOW TEST) Ta=121°C, RH=100%, P=0.21MPa	40	$\frac{100}{0}$	$\frac{200}{0}$		(h)	PASS
7	TEMP. HUMIDITY BIAS	(AFTER REFLOW TEST) Ta=85°C, RH=85% Vopr=Voprmax	49	$\frac{168}{0}$	$\frac{500}{0}$	$\frac{1000}{0}$	(h)	PASS

Results by this product: -

Results by generic devices: No.1~No.7

# AK5707ECB ESD/ LATCH UP Data

WAFER PROCESS : CMOS

PACKAGE TYPE : S-UFBGA16-1.5677×1.5173-0.4

	TEST	CONDITION	S.S.	TEST RESULT	PASS-FAIL RESULT
1	ELECTRO STATIC DISCHARGE (HBM)	CON.: R=1.5kΩ, C=100pF COMMON/POLARITY: AVDD, TVDD, VSS /±(EXECUTED 6 MODES) SUPPLY: 3TIMES/PIN TEST PIN: ALL PINS Ta=25°C	3	DECISION METHOD: LEAK CHECK & OUTGOING INSPECTION RESULT: ±2000V ALL PINS PASS	PASS
2	LATCH UP (PULSE CURRENT APPLICATION)	CON.: DIRECT CURRENT INJECTION COMMON/POLARITY: VSS/± (EXECUTED 2 MODES) TEST PIN: ALL I/O PINS Ta=25°C Vopr=Vopmax	3	DECISION METHOD: CURRENT INCREASE & OUTGOING INSPECTION RESULT: ±200mA ALL PINS PASS	PASS

Results by this product: No.1~No.2

Results by generic devices: -



**Country of origin of the AK5707ECB**

Origin: Taiwan (R.O.C.)

## **AK5707ECB Soldering Methods (Solder Paste: Pb Free) and Handling Precautions**

When plastic surface-mount-device product (hereinafter, "product") which is including excessive amount of moisture is put in the soldering furnace, package cracks may possibly occur in it.

AKM's recommendations regarding soldering method are as below.

### **1. MSL**

This product is worth MSL1. (JEDEC J-STD-020)

### **2. Storage Conditions**

Store this product under the following conditions.

Shelf Life: 60 months from the bag seal date. (The seal date is indicated on the bar code label.)

Storage Conditions: 5~30°C, <85%RH (Recommended to use the product within 1 year after delivery.)

When the products are kept for a long term (more than 1 year after delivery) until soldering, they shall be put in a sealed container with desiccants to prevent the terminal-lead degradation.

### **3. Soldering Conditions**

Please give your consideration on soldering conditions of the products. For reference, AKM presents soldering methods as below. And please check the results of solderability.

- Soldering Methods : IR or Air Reflow (Flow Soldering is not recommended)
- Reflow Times : up to 3 times
- Reflow Profile : Refer to Fig.1

Preheat/Soak	$T_{smin}$	150°C
	$T_{smax}$	200°C
	$T_{smin}$ to $T_{smax}$	60~120s
Liquidous Temperature	$T_L$	217°C
	$t_L$	60~150s
Ramp-up Rate	$T_L$ to $T_p$	3°C/s max.
Peak Package Body Temperature	$T_p$	260°C max.
	$t_p$	30s max.
Ramp-down Rate	$T_p$ to $T_L$	6°C/s max.
Time 25°C to Peak Temperature	25°C to $T_p$	8min max.

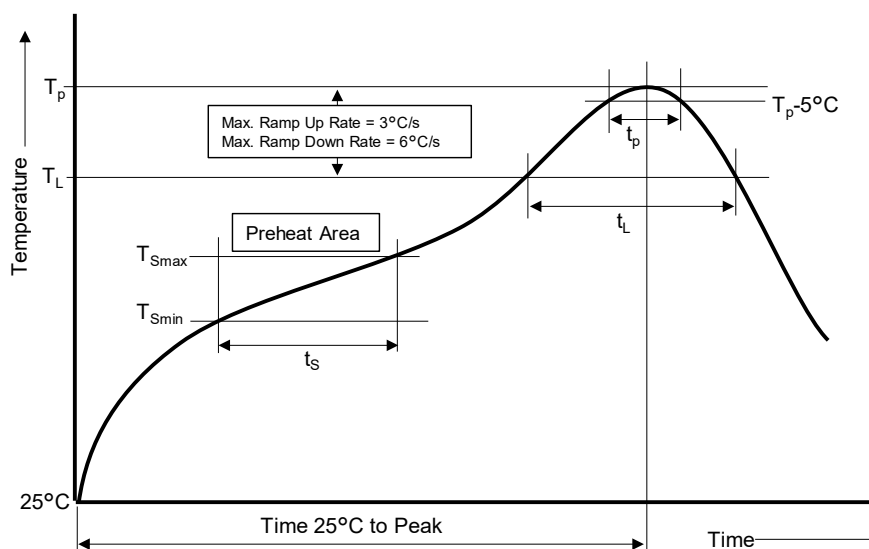


Fig.1 Temperature Profile (Pb Free Solder)

#### **4. Handling Precautions**

(1) Mounting and repair using a soldering iron

According to the general standard for the soldering heat resistance test of semiconductor devices, the temperature of the terminals should be 260°C for 10 seconds or 350°C for 3.5 seconds when heating the solder. If the soldering temperature is high and the time is long, the temperature of the device may rise excessively, which may cause deterioration or destruction.

Carry out sufficient evaluation and use appropriate conditions.

(2) Flux types and cleaning methods

Rosin-based flux (RMA: Mildly Activated Rosin base) is recommended for use during soldering. The flux should be selected with due consideration for the environment and safety.

We recommend the use of general cleaning agents such as quasi-waterborne, hydrocarbon-based, or alcohol-based agents.

We also recommend the use of alcohol-based cleaning agents, which are environmentally and safely safe.

(3) Underfill

We do not recommend the use of underfill.

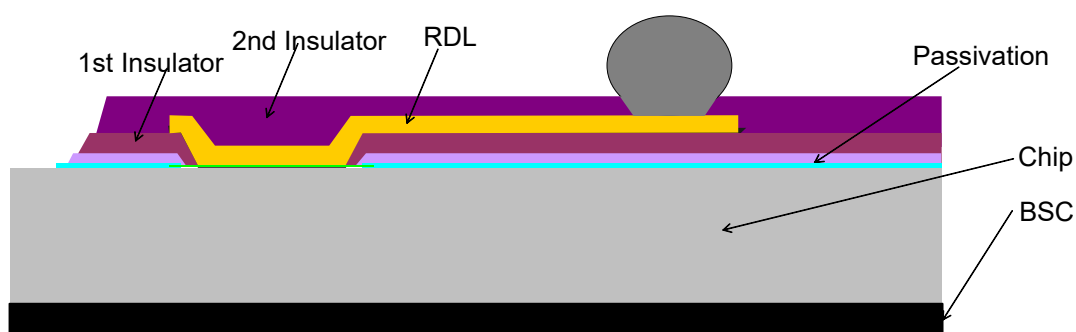
If underfill is to be used in BGA or WL-CSP packages, please evaluate it thoroughly by the customer.

(4) Static Electricity and Electrostatic Discharge

ESD (Electro-Static Discharge) destruction is different from EOS (Electrical Overstress) destruction that occurs during normal operation in that it can also occur before the device is mounted. For this reason, take care during the packing, storage and transportation of semiconductor devices.

# Cross Section: AK5707ECB

Package Type : S-UFBGA16-1.5677×1.5173-0.4



Name	Material
Solder ball	Sn-4Ag-0.5Cu
2nd Insulator	Polyimide
RDL	Ti/Cu/Cu
1st Insulator	Polyimide
Passivation	SiO/SiN/Polyimide
Chip	Si
BSC	Epoxy Resin

## Failure Rate and MTTF Estimation for AK5707ECB

Failure Rate Estimation for AK5707ECB is as follows,

Assuming Arrhenius model for LSI failure mechanism, Temp. accelerating factor AF is described in formula (1).

$$AF = \exp \left[ -Ea / KB \times (1/Tj1 - 1/Tj2) \right] \dots (1)$$

Activation energy (eV) :	Ea
Boltzmann constant :	$K_B$ (8.617×10 <sup>-5</sup> eV/K)
Junction Temp. at stress condition (K) :	Tj1
Junction Temp. at using condition (K) :	Tj2

And junction Temp. Tj is described in formula (2)

$$Tj = Ta + Pd \times \theta_{ja} \dots (2)$$

Ambient Temp. (K) :	Ta
Power dissipation (W) :	Pd
Package thermal resistance (K/W) :	$\theta_{ja}$

As AK5707ECB is CMOS product, power dissipation Pd is very small.

$$Tj = Ta \dots (3)$$

Assuming activation energy Ea=0.46 eV, Temp. accelerating factor AF is calculated from formula (1) and (3).

The results of High Temperature Op-Life test are as follows.

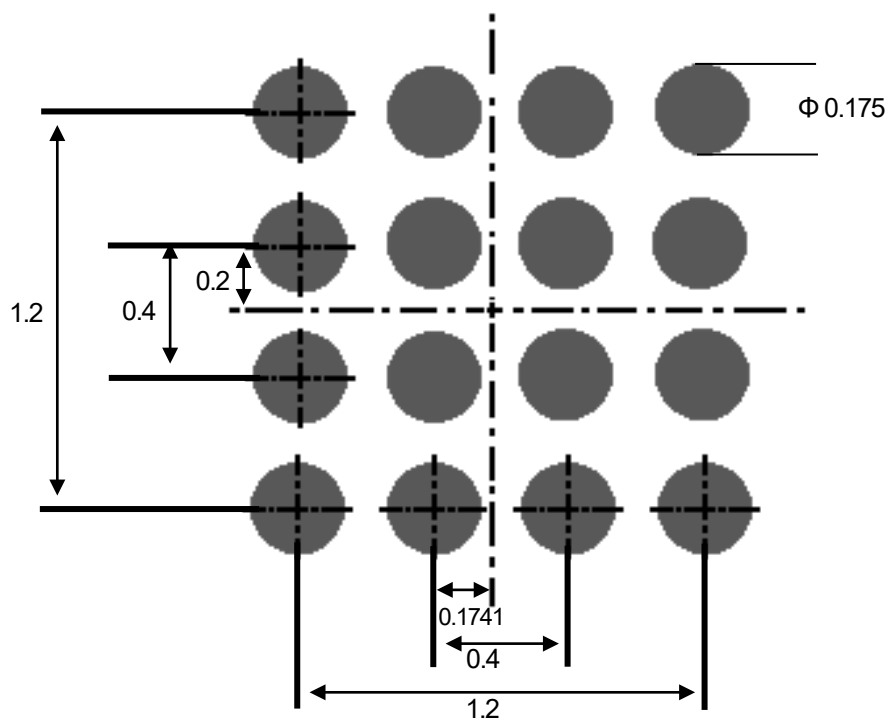
Ambient Temp. (°C):	125
Test life (h) :	1000
No. of samples :	1040 ( total 1040 samples from 13 lots )
Failure counts :	0

The calculated data , Failure Rate ( $\lambda$ ) at 60% confidence level

Using Temp. (°C)	70	55	27
AF	8.6	17.5	79.7
Failure Rate $\lambda$ (Fit)	103	50	11
MTTF (Years)	1100	2300	10000

AK5707ECB Land Pattern for reference

Package Type: S-UFBGA16-1.5677×1.5173-0.4



Unit: mm

※Our Land-pattern for Reference is described above, however, please note that the most suitable dimension for mounting-pad will vary according to following conditions, :Materials of PCB, Kind of soldering paste, soldering method, accuracy of soldering machine, so on.

So, for your actual design for Land-pattern, you should optimize it to your actual condition.

AK5707ECB Mounting Related Test Data

PACKAGE TYPE : S-UFBGA16-1.5677×1.5173-0.4  
SOLDER BALL COMPOSITION : Sn-4Ag-0.5Cu

	TEST	CONDITION	S.S.	TEST RESULT	PASS-FAIL RESULT
1	Solderability	Solderability is not evaluated because this product is solder balls.			
2	Whisker	Whisker is not evaluated because this product is solder balls.			