Standard Specification For
Ceramic Chip Carrier Packages

1. Purpose

The purpose of this specification is to define criteria and inspection method for Surface Mount Type Ceramic Chip Carrier Packages.

2. Scope

This specification shall be applied to Ceramic Chip Carrier Packages. For packages which require additional specifications or for which this specification shall not apply, individual specification shall be issued.

3. Referenced Documents and Priority

3-1. Referenced Documents

1) ANSI/ASQCZ1.4 (latest revision)
2) MIL-STD-883 (latest revision)
3) EIAJ RCX-102/104 (latest revision)
4) JIS C7021
5) Individual piece part drawing
6) Individual Specification (Marginal sample, etc.)

3-2. Priority

In the event of conflicts among the above documents, priority of each document shall be as below;

1) Individual piece part drawing
2) Individual Specification (Marginal sample, etc.)
3) This specification
4) ANSI/ASQCZ1.4, MIL-STD-883, EIAJ RCX-102/104, JIS C7021

4. Requirement

Packages shall satisfy following specification. Final quality assurance shall be in accordance with Table 1 Sampling Plan.

4 -1. Shape

Material shall be specified in individual piece part drawing.

4 -1-1. Ceramics

90% minimum Al_2O_3

4 -1-2. Metallization

Tungsten (W) metallization

4 -1-3. Seal Ring

Kovar

4 -1-4. Brazing Material

Silver Copper (Ag-Cu)

4 -1-5. Plating

Ni-Co plating / Au plating (electrolytic plating)

4 -2. Dimensional and Visual Requirement

4 -2-1. Dimension

General dimensional requirements shall be specified in individual piece part drawing.

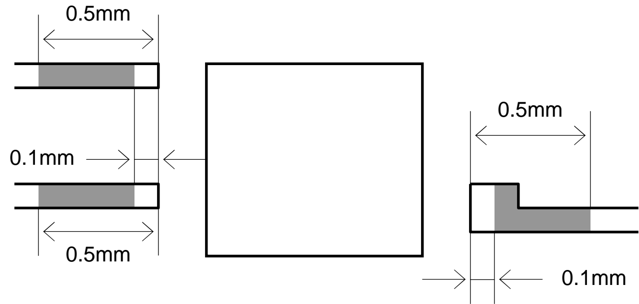
4 -2-2. Visual

Magnification to be used shall be x10 unless otherwise specifically noted.

4 -2-2-1. Definition of Critical Area (hatched area)

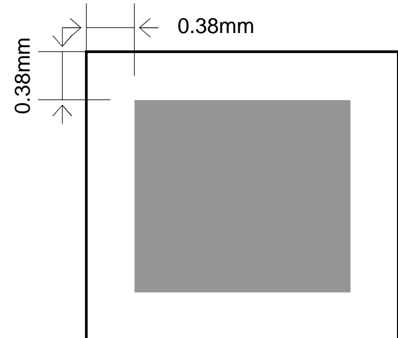
(1) Wire Bonding Area

Up to 0.5mm from the tip of wire bonding pad excluding the first 0.1mm.



(2) Die Attach Area

Within the area apart from cavity wall by 0.38mm.



4 -2-2-2. Ceramic Area

(1) Crack;

There shall be no crack which causes package leak.
Loop crack shall be in accordance with chipping criteria.

(2) Chipping;

0.50 (L) x 0.38 (W) x 0.38 (D) mm max.

(3) Excess Ceramics;

Cavity area: 0.50 (ϕ) x 0.05 (H) mm max.
Back side: 0.50 (ϕ) x 0.05 (H) mm max.

(4) Burr;

Outer dimension shall be within criteria.

(5) Foreign Material;

*: Movable ones are exceptional.
Cavity area: 0.50 (ϕ) x 0.05 (H) mm max.
Back side: 0.50 (ϕ) x 0.05 (H) mm max.

(6) Stain;

Same as (3) Excess Ceramics.

(7) Dent;

0.60 (ϕ) x 0.05 (D) mm max.

(8) Bump;

0.50 (ϕ) x 0.05 (H) mm max.

4 -2-2-3. Pattern Area (including die attach area)

(1) Scratch on plating surface;

There shall be no exposure of under-layer (Ni).

(2) Excess Ceramics;

*: Movable ones are exceptional.
Critical Wire Bonding Area: 0.05 (ϕ) x 0.03 (H) mm max.
Critical Die Attach Area: 0.05 (ϕ) x 0.03 (H) mm max.
Other Area: 0.50 (ϕ) x 0.03 (H) mm max.

(3) Dent;

Critical Wire Bonding Area: There shall be no exposure of under-layer.
Critical Die Attach Area: 0.50 (ϕ) x 0.03 (D) mm max.
Other Area: Any allowed

(4) Smear;
1/2 max. of pattern space.

(5) Foreign Material;
Critical Wire Bonding Area: Same as 4 -2-2-3 (2) Excess Ceramics.
Critical Die Attach Area: Same as 4 -2-2-3 (2) Excess Ceramics.
Other Area: Same as 4 -2-2-3 (2) Excess Ceramics.

(6) Stain;
Critical Wire Bonding Area: Same as 4 -2-2-3 (2) Excess Ceramics.
Critical Die Attach Area: Same as 4 -2-2-3 (2) Excess Ceramics.
Other Area: Same as 4 -2-2-3 (2) Excess Ceramics.

(7) Missing Pattern;
Critical Wire Bonding Area: 0.05 (L) x 0.05 (W) mm max.
Critical Die Attach Area: 0.10 (L) x 0.10 (W) mm max.
Other Area: 1/3 max. of pattern width.

(8) Lamination Misalignment;
1/3 (W) max. of castellation diameter at castellation area.

(9) Bump;
0.50 (ϕ) x 0.05 (H) mm max.

4 -2-2-4. Seal Ring Area

(1) Dent;
Outer half of seal ring area: 0.10 (ϕ) x 0.03 (D) mm max.
Inner half of seal ring area: Any allowed subject to no exposure of under-layer.

(2) Scratch;
There shall be no exposure of under-layer.

(3) Foreign Material;
Outer half of seal ring area: 0.10 (ϕ) x 0.03 (H) mm max.
Inner half of seal ring area: Any allowed subject to no exposure of under-layer.

(4) Bump;
Outer half of seal ring area: 0.10 (ϕ) x 0.03 (H) mm max.
Inner half of seal ring area: Any allowed subject to no exposure of under-layer.

(5) KV Ring Position;
KV ring should not exceed from seal ring pattern for any direction.

4 -2-2-5. Back Side Pad Area

(1) Missing Pattern;
1/4 max. of pattern width.

(2) Dent;
Through hole area: Any allowed subject to no leak failure.
Other area: 0.50 (ϕ) x 0.05 (D) mm max.

(3) Foreign Material;
0.50 (ϕ) x 0.05 (H) mm max.

4 -2-3. Major Defect

(1) Electrical Short
(2) Electrical Open
(3) Substrate Crack
(4) Mixture of other item

4 -3. Plating

4 -3-1. Plating Layer

Plating layer shall be in accordance with individual piece part drawing.

4 -3-2. Measurement of Plating Thickness

Plating thickness shall be measured at back side pad by Fluorescent X-ray.

4 -3-3. Thermal Resistivity

There shall be no discoloration nor blisters on plating surface after heating at 5 minutes.

Au thickness	Temperature
1.5um max.	450 +10/-0'C
0.7um max.	300 +10/-0'C

(Heating shall be done by heater-block or oven.)

4 -3-4. Solderability (Aging shall be excluded)

Minimum of 90% shall be wet after dipping at 230 +/-10'C for 5-10 seconds,
per MIL-STD-883C Method 2003.

4 -3-5. Wire Bondability

Ultra Sonic Bonding shall be used with Al wire (ϕ 30um).
The bonding shall be applied between adjacent two bonding pads.
The wire bond pull strength shall be tested using wire bonded samples per above procedure.
The pull strength shall be 3g min. and no wire lifting shall be allowed between a wire and a bond Pad.

4 -4. Electrical Properties

4 -4 -1. Insulation Resistance

Unless otherwise specified, minimum resistance shall be 1 x 10^8 ohm at DC 100V between adjacent patterns.
Measuring atmosphere shall be 25 +/-5'C, 40-70%RH.

4 -5. Environmental Test

4 -5-1. Hermeticity

The substrate that is required hermeticity shall be denoted in individual specification.
In that case, less than 1 x 10^{-8} atm cc/sec by Helium detector shall be guaranteed at unsealed packages.

4 -6. Reliability Test (Test shall be done by mutual discussion)

4 -6-1. Test Method of Soldering of Surface Mounting Devices

(1) Detail test methods of Solderability	EIAJ RCX-0102/101
(2) Detail test methods of Soldering heat	EIAJ RCX-0102/102
(3) Detail test methods of Resistance to Dissolution of Metallization	EIAJ RCX-0102/103

4 -6-2. Test Method of Mechanical Strength of Surface Mounting Devices

(1) Detail test methods of Substrate Bending	EIAJ RCX-0104/101
(2) Detail test methods of Shear	EIAJ RCX-0104/102
(3) Detail test methods of Pull-off Strength	EIAJ RCX-0104/103
(4) Detail test methods of Body Strength	EIAJ RCX-0104/104

4 -7. Packing and labeling

4 -7-1. Packing

(1) Packages shall be packed in either the customer specified tray or SMI-ED specified tray.
In case of the customer specified tray, exclusive tray shall be used.
In case of SMI-ED specified tray, tray size may be changed by package size.

(2) Alignment of packages
In case of customer specified tray, alignment of tray shall be in accordance with the instruction by the customer.
For SMI-ED specified tray, alignment method shall be determined by mutual discussion.

4 -7-2. Labeling

Each packing shall be labeled including following information.
(1) Part name

5. Disposal of returned goods

5-1. Disposal of returned goods

Those shipment lots which failed at the customer's incoming inspection shall be rejected and returned to SMI-ED. The replacement shipment shall be made as soon as possible.

5-2. Screening

The returned lot can be re-shipped if the cause of defect is found and defect is screenable.
The lot number of re-shipment shall be prefixed by "R".
Any objections to the defects shall be settled by the mutual discussion.

6. Quality Controls

6-1. Quality Controls

The supplier shall implement the appropriate quality control through its manufacturing process.

6-2. Data Storage

(1) Manufacturing data and quality control records shall be kept for at least 1 year after shipment unless otherwise specified.
(2) C of C shall be attached to every shipment.
The C of C items shall be determined by mutual discussion.

6-3. Changes in Manufacturing Methods/Materials

Any changes in manufacturing methods, process/materials which may be affect the final product's quality shall be agreed mutually prior to the implementation of the changes.

6-4. Lot Assignment

Lot number shall be assigned for each shipment.
The shipment lot is allowed to consist of plural manufacturing lots.

7. Specification Update

The contents of this specification shall be reviewed and updated by mutual discussion.

Table-1 Sampling Plan

Item #	Item		Sampling Method		Remarks
			Level	AQL %	
4 -2	Dimension		n = 13, 0/1 (equivalent to AQL 1.0%)		
	Visual		I	1.5	
		Major Defect	S-4	0.4	
4 -3	Plating				
		Thickness	n = 13, 0/1 (equivalent to AQL 1.0%)		
		Thermal Resistivity			
		Solderability	n = 8, 0/1 (equivalent to AQL 1.5%)		
		Wire Bondability			
4 -4	Electrical Properties		n = 13, 0/1 (equivalent to AQL 1.0%)		
4 -5	Hermeticity		S-3	0.65	
4 -6	Reliability Test		To be determined upon mutual discussion		

Revision History

Rev.#	Date	Content
Ori.	Apr. 07, '03	Original release

Approved by			
Q.A. Dept.		Ceramic Prod. & Eng'g Dept.	
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