

**APPLICATIONS REPORT for BEST INC.**  
**EZReball™ Preform Product Inspection on LS-8800**

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Date: October 11, 2007

## **SUMMARY OF RESULTS**

### **Introduction:**

The purpose of this report is to summarize the LS-8800 inspection results of RD14408012012030 (10 mil thick preform) and RC25612727027060 (15 mil thick preform) devices supplied by BEST Inc. of Rolling Meadows, IL. These devices are 144 ball, 0.08mm pitch, 12x12mm packages and 256 ball, 1.27mm pitch, 27x27mm packages, respectively.

### **Samples Tested:**

RVSI received samples of both the 144 ball, 0.08mm pitch 12x12mm sample devices as well as the 256 ball, 1.27mm pitch, 27x27mm sample devices from BEST Inc.

### **Approach:**

Tray, chip and job specs were written and the supplied device samples were inspected to demonstrate the capability of the LS-8800 to accurately measure diameter, height and other parameters of the balls on the supplied devices. Some of the measurement results have been imported into this document.

### **Conclusions:**

The results included in this report demonstrate the capability of the LS-8800 to fully achieve the measurement requirements of BEST Inc. No devices were found to have missing balls.

Package Specification: BEST-256-BGA-27x27mm

Package : BEST-256-BGA-27x27mm

Sensor Ht.: 292.15 mils

CAPABILITY ANALYSIS	LSL	NOMINAL	USL	MIN	MEAN	MAX	SIGMA	3SIGMA	Cp	Cpk	Good Cpk
DIAMETER	18.00	22.00	26.00	19.10	21.47	26.90	0.98	2.95	1.36	1.18	0.00
BALL HEIGHT	1.00	3.00	5.00	2.04	2.72	4.95	0.37	1.11	1.81	1.55	0.00

Typical Measurements for ball **Diameter** exposed by the preform and Z-Axis **Ball Height** from top of preform to the top of the ball

**(Exposed) DIAMETER**

Ball	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	T	U	V	W	Y
1	21.1	20.7	20.3	20.3	20.1	20.5	20.7	19.8	20.7	20.2	20.4	20.2	20.4	20.1	20.5	19.9	20.3	20.1	20.4	21.5
2	21.0	21.7	20.6	22.5	21.5	20.9	20.7	20.5	20.3	20.1	20.4	20.5	20.7	20.0	20.5	20.4	20.1	20.8	20.8	20.3
3	20.7	21.6	22.1	21.0	21.4	20.8	21.4	20.9	20.7	20.2	20.1	20.6	20.4	20.7	20.4	20.3	20.2	20.6	20.2	20.8
4	21.5	21.4	21.4	23.3	22.0	20.9	20.1	21.3	21.0	21.4	20.5	21.1	20.7	20.9	19.8	20.3	20.0	20.6	20.4	20.1
5	21.7	21.7	21.5	22.9													20.3	20.4	20.4	21.2
6	21.1	21.6	21.6	20.9													20.7	20.7	21.0	21.8
7	21.5	21.2	21.0	19.4													20.1	19.4	20.5	21.1
8	23.1	22.3	21.1	21.0													20.0	20.7	20.2	20.3
9	21.0	23.2	22.9	21.0													20.3	20.7	20.1	20.7
10	23.4	22.6	23.4	21.0													20.5	20.3	20.8	20.8
11	23.2	22.7	23.4	22.0													22.2	21.2	20.7	21.8
12	22.5	22.4	22.7	21.0													21.6	20.8	20.8	21.2
13	22.7	22.4	21.0	22.0													21.2	20.4	21.1	20.6
14	20.7	21.6	21.9	22.1													21.8	21.8	20.7	19.6
15	21.8	24.0	23.2	21.7													22.3	21.1	22.0	20.2
16	22.6	22.1	23.5	21.9													22.4	21.9	21.5	20.4
17	22.5	21.8	23.0	22.1	22.9	21.2	21.4	22.4	21.7	21.4	22.3	22.1	22.1	22.9	22.9	23.8	23.7	23.0	20.9	21.0
18	21.9	22.7	22.8	22.7	22.7	22.6	21.7	21.3	21.7	21.1	21.5	22.4	22.4	23.0	23.1	22.7	22.9	22.5	21.4	20.9
19	22.0	24.4	21.7	21.9	22.6	22.3	22.4	22.2	22.1	22.4	22.7	21.6	21.7	21.8	22.6	22.3	22.4	21.3	21.5	20.9
20	22.4	22.8	21.1	23.3	23.1	22.5	22.4	21.9	21.9	21.8	21.7	21.5	22.3	22.3	21.3	22.3	21.5	22.6	20.5	21.4

**(Exposed) BALL HEIGHT**

Ball	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	T	U	V	W	Y
1	2.6	2.4	2.3	2.3	2.2	2.2	2.3	2.1	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.3	2.6
2	2.5	2.9	2.6	2.9	2.6	2.5	2.3	2.4	2.2	2.1	2.3	2.3	2.3	2.1	2.3	2.2	2.2	2.3	2.3	2.4
3	2.6	2.8	2.9	2.3	2.8	2.5	2.4	2.4	2.4	2.2	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.5
4	2.6	2.7	2.7	3.2	2.8	2.3	2.2	2.4	2.4	2.6	2.4	2.5	2.3	2.3	2.2	2.2	2.1	2.3	2.2	2.3
5	2.7	2.7	2.7	3.1													2.2	2.2	2.2	2.6
6	2.5	2.6	2.7	2.3													2.2	2.2	2.2	2.5
7	2.9	2.7	2.8	2.3													2.2	2.2	2.3	2.5
8	3.1	3.2	2.7	2.7													2.2	2.2	2.3	2.4
9	2.8	3.1	3.2	2.5													2.2	2.2	2.3	2.5
10	3.2	3.0	3.1	2.5													2.3	2.2	2.2	2.4
11	3.1	3.3	3.1	3.0													2.9	2.4	2.3	2.7
12	2.9	2.9	2.9	2.5													2.6	2.3	2.3	2.6
13	2.9	3.1	2.6	2.8													2.5	2.2	2.2	2.3
14	2.6	3.1	3.0	3.0													2.9	3.0	2.5	2.3
15	3.1	3.8	3.7	3.0													2.9	2.8	2.9	2.4
16	3.2	3.1	3.7	3.1													3.2	2.8	2.8	2.5
17	3.1	2.7	3.4	3.1	3.3	2.8	2.7	3.0	2.7	2.8	2.9	2.9	2.9	3.2	3.1	3.7	3.6	3.3	2.5	2.6
18	2.8	3.0	3.1	3.0	2.8	3.3	2.6	2.6	2.9	2.7	2.8	2.9	3.1	3.1	3.1	3.2	3.4	3.1	2.7	2.5
19	3.0	3.7	2.8	2.6	3.2	3.0	2.9	2.9	2.9	3.0	3.1	2.7	2.8	2.8	3.1	3.0	3.0	2.7	2.5	2.3
20	2.9	3.0	2.5	3.2	3.3	3.0	3.0	2.9	2.9	2.8	2.7	2.7	2.9	2.9	2.6	2.9	2.9	3.0	2.4	2.6

Package Specification: BEST-144-BGA-12 x 12mm

Package : 144FBGA-12x12mm

Sensor Ht.: 244.00 mils

CAPABILITY ANALYSIS	LSL	NOMINAL	USL	MIN	MEAN	MAX	SIGMA	3SIGMA	Cp	Cpk	Good Cpk
DIAMETER	9.00	12.00	15.00	10.68	11.72	14.71	0.40	1.20	2.51	2.27	1.99
BALL HEIGHT	1.00	4.00	7.00	3.02	4.06	4.88	0.21	0.64	4.71	4.62	4.19

Typical Measurements for ball **Diameter** exposed by the preform and Z-Axis **Ball Height** from top of preform to the top of the ball

**(Exposed) DIAMETER**

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Ball|| A   B   C   D   E   F   G   H   J   K   L   M
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1 || 11.6 11.7 11.8 11.4 11.6 11.5 11.8 11.5 11.7 11.5 11.4 11.3
2 || 11.8 11.8 11.5 11.5 11.7 11.3 11.6 11.3 11.2 11.7 11.3 11.3
3 || 11.4 11.6 11.8 11.5 10.9 11.7 11.6 11.2 11.5 11.5 11.6 12.0
4 || 11.1 11.8 11.4 11.5 11.3 11.3 11.7 11.6 11.9 11.6 12.4 11.6
5 || 11.7 11.6 11.5 11.1 11.3 11.0 12.0 11.6 11.6 11.6 11.5 11.7
6 || 11.6 11.6 11.4 11.5 11.2 11.1 11.3 11.4 11.4 11.6 11.6 12.1
7 || 11.9 12.0 11.4 11.3 11.0 11.4 11.6 11.7 11.8 11.5 11.8 11.5
8 || 12.1 11.7 11.6 11.7 11.2 11.2 11.5 11.5 11.8 11.8 11.8 11.5
9 || 11.7 11.2 11.5 11.4 11.1 11.7 12.0 11.4 12.0 12.0 12.0 12.3
10 || 11.0 11.6 11.5 12.0 11.5 11.7 11.9 11.4 12.1 12.1 12.0 12.0
11 || 11.0 11.6 11.3 11.2 11.5 11.4 11.6 11.3 11.8 11.8 12.1 11.7
12 || 11.6 11.3 11.7 12.1 11.4 11.4 11.7 11.4 11.6 11.7 11.2 11.7
    
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**(Exposed) BALL HEIGHT**

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Ball|| A   B   C   D   E   F   G   H   J   K   L   M
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1 || 4.1  4.2  4.0  3.9  3.9  4.3  4.1  3.9  4.1  3.8  3.8  3.8
2 || 4.2  4.1  3.9  3.9  4.0  3.9  4.0  3.8  3.8  4.1  4.0  3.9
3 || 4.1  3.9  4.1  3.8  3.7  4.0  4.2  4.1  4.0  4.0  4.0  4.2
4 || 4.0  4.2  3.8  3.8  4.0  3.9  4.2  4.2  4.4  4.3  4.3  4.1
5 || 4.1  3.9  3.8  3.7  3.8  3.8  4.0  4.0  4.0  3.9  3.9  4.0
6 || 3.9  4.2  3.8  3.9  3.7  3.7  3.8  3.9  3.9  4.0  4.1  4.2
7 || 4.4  4.1  4.0  4.3  3.6  3.9  4.1  3.9  4.5  3.9  4.1  3.9
8 || 4.4  4.2  4.0  4.0  3.7  3.8  4.0  3.9  4.2  4.3  4.0  4.0
9 || 3.8  3.9  3.8  4.2  3.6  4.1  4.2  4.1  4.3  4.3  4.2  4.3
10 || 3.6  3.9  3.8  4.3  3.8  4.2  4.2  4.0  4.4  4.2  4.4  4.2
11 || 3.8  3.8  4.0  4.0  4.0  4.1  4.0  4.0  4.6  4.3  4.1  3.9
12 || 4.3  3.8  4.2  4.4  4.1  3.9  4.2  3.9  4.2  4.1  4.0  4.0
    
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