



CSP TAPE & REEL

Chip Scale Packages for Memory Products Tape and Reel Shipping Media

INTRODUCTION

Surface mounting packages can be supplied with Tape and Reel packing.

The reels are standard 330mm diameter (150mm for SBGA) and contain between 250 and 2500 devices. The packages supplied on Tape and Reel are listed in Table 1 that shows the Tape Width and Part Pitch used, and the Quantity per reel.

The tape used are either plastic antistatic or conductive with a black conductive cavity tape. The cover tape is transparent antistatic or conductive.

Devices are orientated in the cavities with the identifying ball (normally ball "A1") on the same side as the sprocket holes in the tape.

The STMicroelectronics Tape & Reel specifications are compliant to the EIA 481-A standard specification.

Table 1. CSP Packages on Tape and Reel

Package Type	Body Dimension	Description	Tape Width (W)	Part Pitch (P)	Q.ty per Reel	Table
BGA	10 x 12 mm	Ball Grid Array	24 mm	16 mm	1500	5
LGA	10 x 12 mm	Land Grid Array	24 mm	16 mm	1500	5
LFBGA	8 x 9 mm	Fine Pitch Ball Grid Array	16 mm	12 mm	2500	6
LFBGA	7 x 12 mm	Fine Pitch Ball Grid Array	24 mm	12 mm	2500	7
LFBGA	7 x 7 mm	Fine Pitch Ball Grid Array	16 mm	12 mm	2500	8
LFBGA	8 x 12 mm	Fine Pitch Ball Grid Array	24 mm	16 mm	1500	9
TFBGA	6.39 x 6.37 mm	Thin Fine Pitch Ball Grid Array	16 mm	8 mm	2500	10
TFBGA	6.39 x 10.50 mm	Thin Fine Pitch Ball Grid Array	24 mm	8 mm	2500	11
TFBGA	6 x 9 mm	Thin Fine Pitch Ball Grid Array	16 mm	12 mm	2500	12
μBGA	6.39 x 6.37 mm	Micro Ball Grid Array	16 mm	8 mm	2500	10
μBGA	6.39 x 10.50 mm	Micro Ball Grid Array	24 mm	8 mm	2500	11
μBGA	6.8 x 9.6 mm	Micro Ball Grid Array	16 mm	12 mm	2500	13
μBGA	7.15 x 9.3 mm	Micro Ball Grid Array	24 mm	12 mm	2500	14
SBGA	1.90 x 1.75 mm	Shell Ball Grid Array	8 mm	4 mm	2500	15
SBGA	1.745 x 1.965 mm	Shell Ball Grid Array	8 mm	4 mm	2500	16

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Figure 1. Reel Diagram

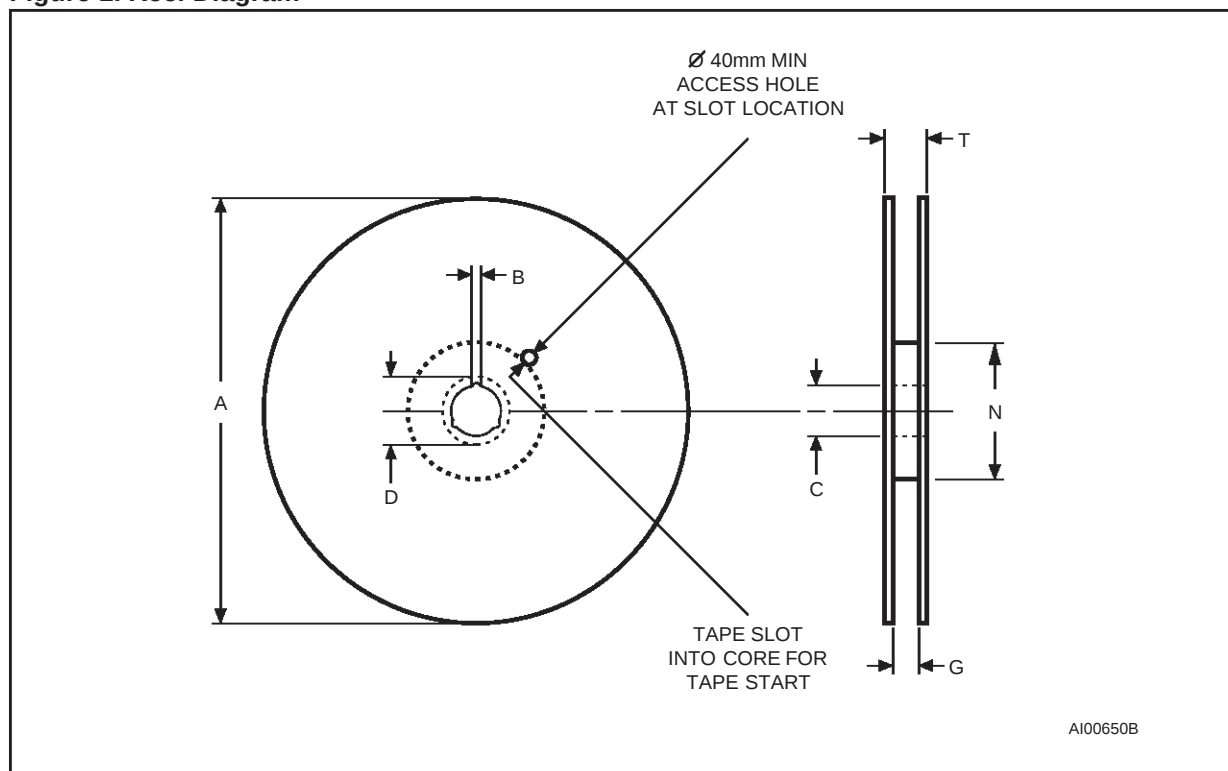


Table 2. Reel Dimensions

Tape Size	A Max	B Min	C	D Min	G	N Min	T Max	Unit
8 mm	330	1.5	13 ± 0.2	20.2	8.4 +2 / -0	60	14.4	mm
8 mm	180 ⁽¹⁾	1.5	13 ± 0.2	20.2	8.4 +2 / -0	60	14.4	mm
12 mm	330	1.5	13 ± 0.2	20.2	12.4 +2 / -0	60	18.4	mm
16 mm	330	1.5	13 ± 0.2	20.2	16.4 +2 / -0	60	22.4	mm
24 mm	330	1.5	13 ± 0.2	20.2	24.4 +2 / -0	60	30.4	mm

Note: 1. For SBGA packages only.

Figure 2. Leader and Trailer

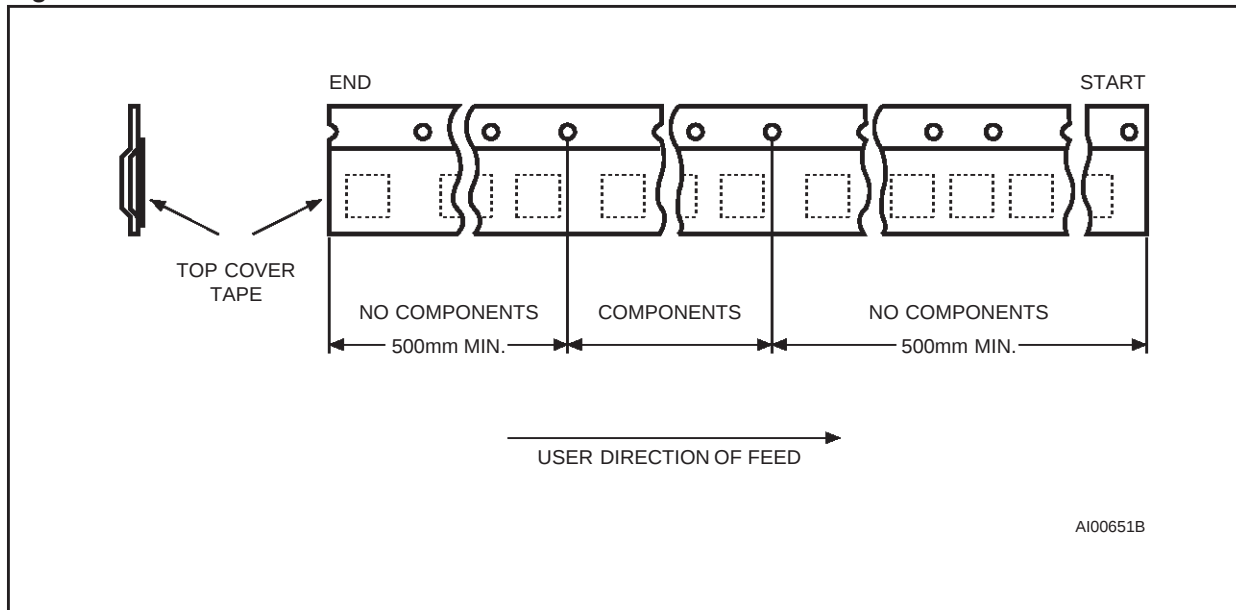
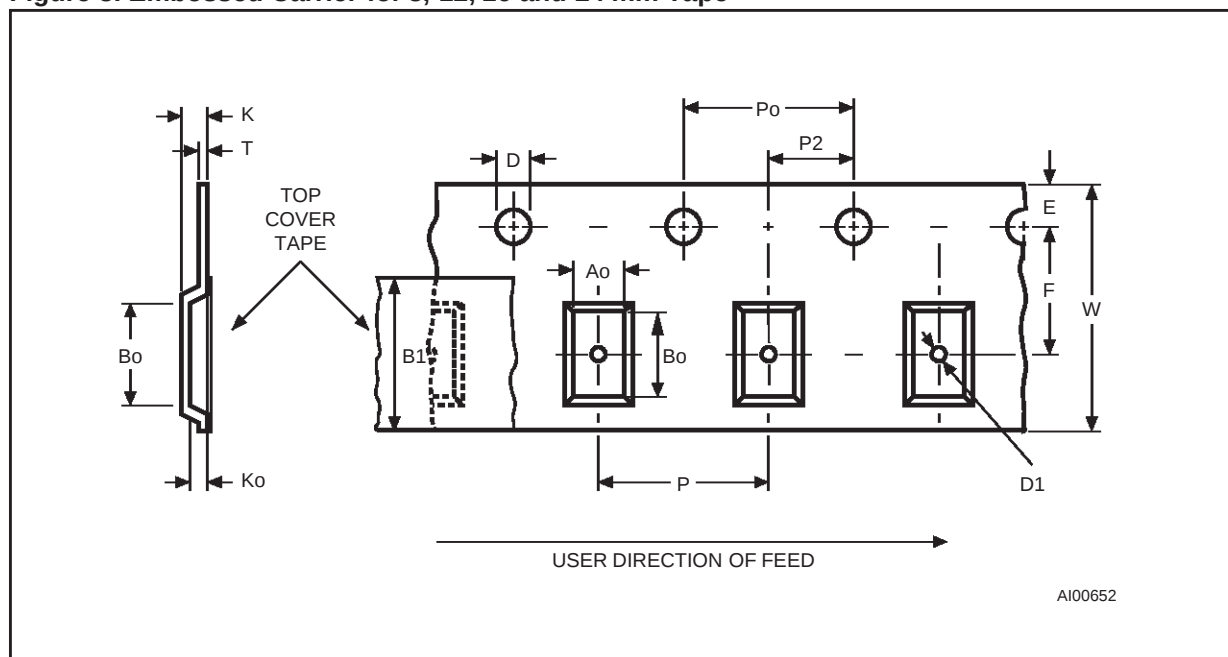


Figure 3. Embossed Carrier for 8, 12, 16 and 24 mm Tape



Drawing is not to scale.

Table 3. Carrier Tape Constant Dimensions

Tape Size	Ao, Bo, Ko	D	E	Po	T Max	Unit
8 mm	see Note	1.5 +0.1 / -0	1.75 ± 0.1	4 ± 0.1	0.4	mm
12 mm	see Note	1.5 +0.1 / -0	1.75 ± 0.1	4 ± 0.1	0.4	mm
16 mm	see Note	1.5 +0.1 / -0	1.75 ± 0.1	4 ± 0.1	0.4	mm
24 mm	see Note	1.5 +0.1 / -0	1.75 ± 0.1	4 ± 0.1	0.4	mm

Note: Ao, Bo, Ko, are determined by components sizes. The clearance between the component and the cavity must be within:

- 8 mm tape: 0.05 mm min. to 0.50 mm max.
- 12 mm tape: 0.05 mm min. to 0.65 mm max.
- 16 mm tape: 0.05 mm min. to 0.90 mm max.
- 24 mm tape: 0.05 mm min. to 1.00 mm max.

Table 4. Carrier Tape Variable Dimensions

Tape Size	B1 Max	D1 Min	F	K Max	P	P2	W	Unit
8 mm	4.2	1	3.5 ± 0.05	2.4	see Note	2 ± 0.05	8 ± 0.3	mm
8 mm	5.4 ⁽¹⁾	1	3.5 ± 0.05	2.4	see Note	2 ± 0.05	8 ± 0.3	mm
16 mm	8.2	1.5	5.5 ± 0.05	4.5	see Note	2 ± 0.05	12 ± 0.3	mm
16 mm	12.1	1.5	7.5 ± 0.1	6.5	see Note	2 ± 0.1	16 ± 0.3	mm
24 mm	20.1	1.5	11.5 ± 0.1	6.5	see Note	2 ± 0.1	24 ± 0.3	mm

Note: P is determined by components sizes.

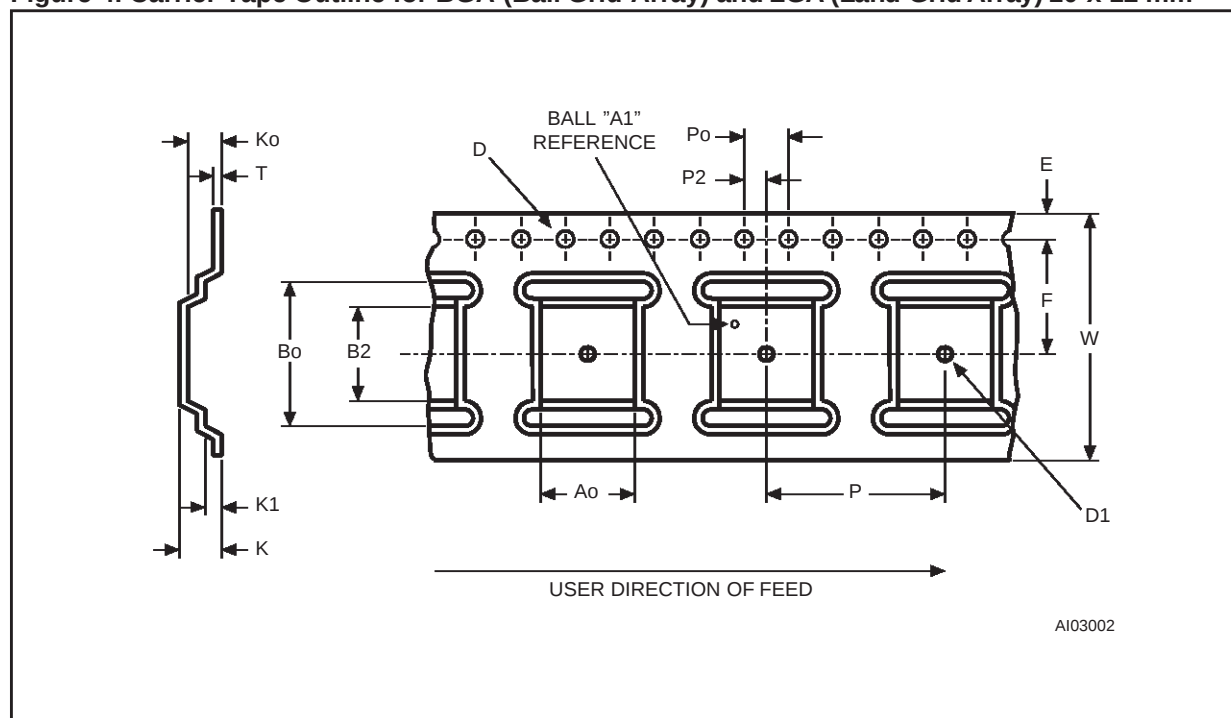
1. For SBGA packages only.

Table 5. Carrier Tape Mechanical Data for BGA (Ball Grid Array) and LGA (Land Grid Array) 10 x 12 mm

Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	10.40	10.30	10.50	0.409	0.406	0.413
Bo	12.40	12.30	12.50	0.488	0.484	0.492
B2	8.40	8.30	8.50	0.331	0.327	0.335
Ø D	1.50	1.50	1.60	0.059	0.059	0.063
Ø D1		1.50	–		0.059	–
E	1.75	1.65	1.85	0.069	0.065	0.073
F (2)	11.50	11.40	11.60	0.453	0.449	0.457
K	2.40	2.30	2.50	0.094	0.091	0.098
Ko	2.10	2.00	2.20	0.083	0.079	0.087
K1	1.40	1.30	1.50	0.055	0.051	0.059
P	16.00	–	–	0.630	–	–
P0 (1)	4.00	–	–	0.157	–	–
P2 (2)	2.00	–	–	0.079	–	–
T	0.30	0.25	0.35	0.012	0.010	0.014
W	24.00	23.70	24.30	0.945	0.933	0.957

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 4. Carrier Tape Outline for BGA (Ball Grid Array) and LGA (Land Grid Array) 10 x 12 mm

Drawing is not to scale.

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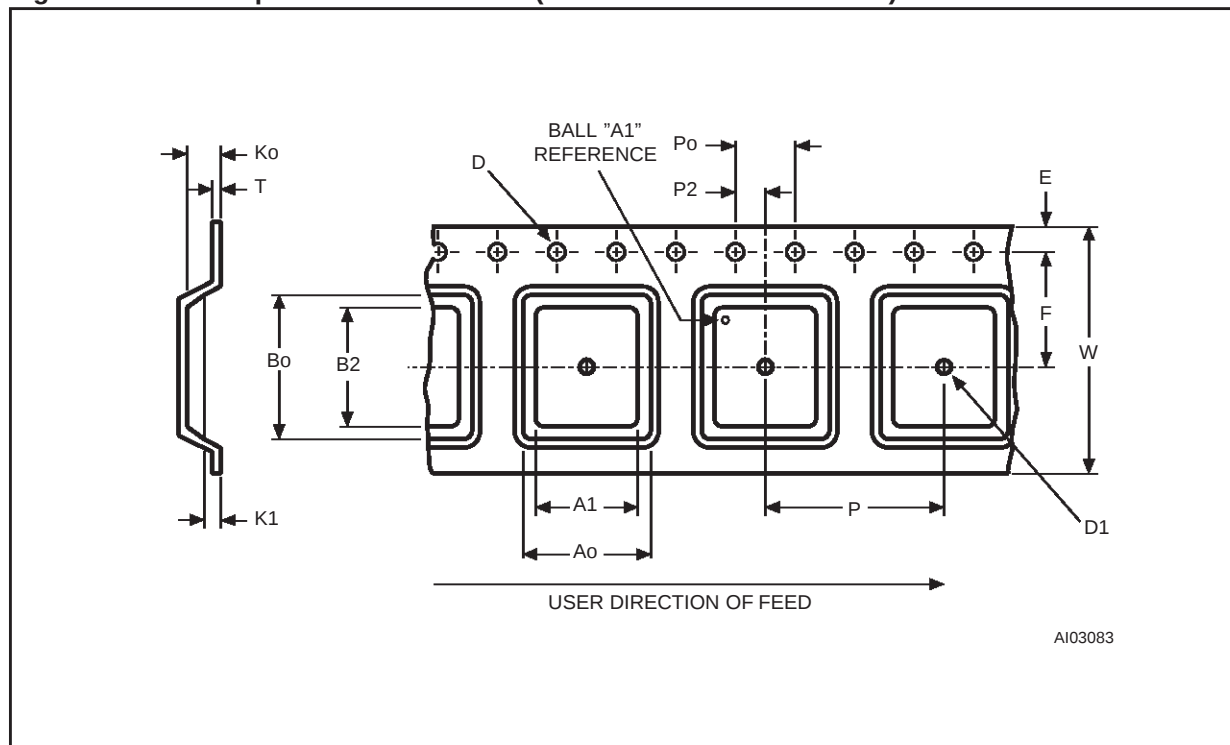
Table 6. Carrier Tape Mechanical Data for LFBGA (Low Profile Fine Pitch BGA) 8 x 9 mm

Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	8.50	8.40	8.60	0.335	0.331	0.339
Bo	9.50	9.40	9.60	0.374	0.370	0.378
B2	7.50	7.40	7.60	0.295	0.291	0.299
Ø D		1.50	1.60		0.059	0.063
Ø D1		1.50			0.059	
E	1.75	1.65	1.85	0.069	0.065	0.073
F (2)	7.50	7.40	7.60	0.295	0.291	0.299
Ko	2.00	1.90	2.10	0.079	0.075	0.083
K1	1.10	1.00	1.20	0.043	0.039	0.047
P	12.00	–	–	0.472	–	–
Po (1)	4.00	–	–	0.157	–	–
P2 (2)	2.00	–	–	0.079	–	–
T	0.30	0.25	0.35	0.012	0.010	0.014
W	16.00	15.70	16.30	0.630	0.618	0.642

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 5. Carrier Tape Outline for LFBGA (Low Profile Fine Pitch BGA) 8 x 9 mm



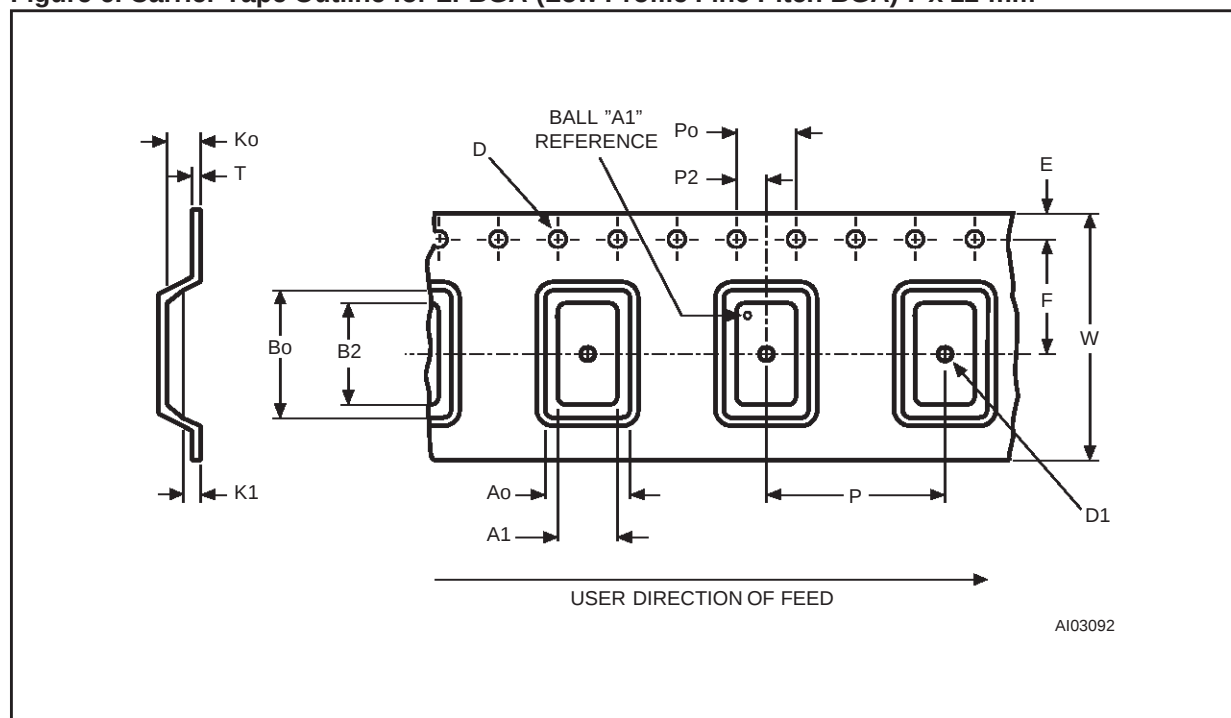
Drawing is not to scale.

Table 7. Carrier Tape Mechanical Data for LFBGA (Low Profile Fine Pitch BGA) 7 x 12 mm

Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	7.50	7.40	7.60	0.295	0.291	0.299
A1	5.50	5.40	5.60	0.217	0.213	0.220
Bo	12.50	12.40	12.60	0.492	0.488	0.496
B2	10.50	10.40	10.60	0.413	0.409	0.417
Ø D	1.50	1.50	1.60	0.059	0.059	0.063
Ø D1		1.50			0.059	
E	1.75	1.65	1.85	0.069	0.065	0.073
F ⁽²⁾	11.50	11.40	11.60	0.453	0.449	0.457
Ko	2.50	2.40	2.60	0.098	0.094	0.102
K1	1.50	1.40	1.60	0.059	0.055	0.063
P	12.00	–	–	0.472	–	–
P0 ⁽¹⁾	4.00	–	–	0.157	–	–
P2 ⁽²⁾	2.00	–	–	0.079	–	–
T	0.30	0.25	0.35	0.012	0.010	0.014
W	24.00	23.70	24.30	0.945	0.933	0.957

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 6. Carrier Tape Outline for LFBGA (Low Profile Fine Pitch BGA) 7 x 12 mm

Drawing is not to scale.

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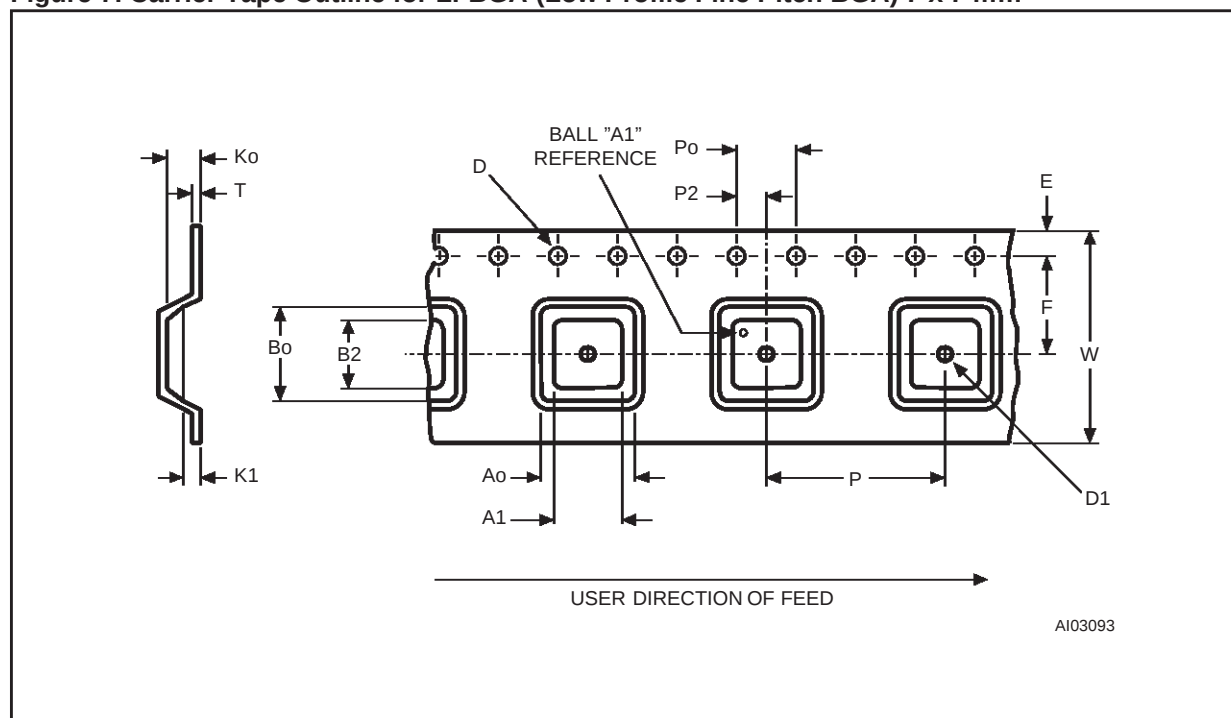
Table 8. Carrier Tape Mechanical Data for LFBGA (Low Profile Fine Pitch BGA) 7 x 7 mm

Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	7.50	7.40	7.60	0.295	0.291	0.299
A1	5.50	5.40	5.60	0.217	0.213	0.220
Bo	7.50	7.40	7.60	0.295	0.291	0.299
B2	5.50	5.40	5.60	0.217	0.213	0.220
Ø D	1.50	1.50	1.60	0.059	0.059	0.063
Ø D1		1.50			0.059	
E	1.75	1.65	1.85	0.069	0.065	0.073
F ⁽²⁾	7.50	7.40	7.60	0.295	0.291	0.299
Ko	2.30	2.20	2.40	0.091	0.087	0.094
K1	1.30	1.20	1.40	0.051	0.047	0.055
P	12.00	–	–	0.472	–	–
P0 ⁽¹⁾	4.00	–	–	0.157	–	–
P2 ⁽²⁾	2.00	–	–	0.079	–	–
T	0.30	0.25	0.35	0.012	0.010	0.014
W	16.00	15.70	16.30	0.630	0.618	0.642

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 7. Carrier Tape Outline for LFBGA (Low Profile Fine Pitch BGA) 7 x 7 mm



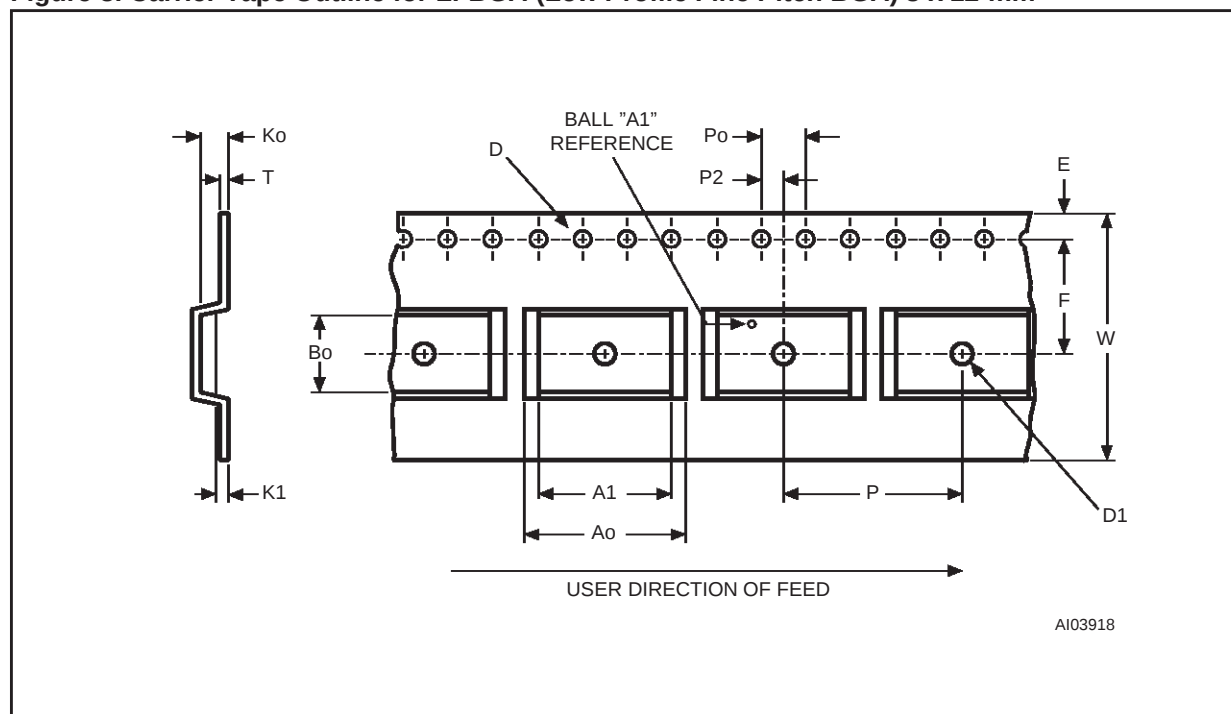
Drawing is not to scale.

Table 9. Carrier Tape Mechanical Data for LFBGA (Low Profile Fine Pitch BGA) 8 x 12 mm

Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	12.30	12.20	12.40	0.484	0.480	0.488
A1	9.90	9.80	10.00	0.390	0.386	0.394
Bo	8.13	8.03	8.23	0.320	0.160	0.324
Ø D	1.55	1.50	1.60	0.061	0.059	0.063
Ø D1		1.50			0.059	
E	1.75	1.65	1.85	0.069	0.065	0.073
F (2)	11.50	11.40	11.60	0.453	0.449	0.457
Ko	2.00	1.90	2.10	0.079	0.075	0.083
K1	1.40	1.30	1.50	0.055	0.051	0.059
P	16.00	–	–	0.630	–	–
Po (1)	4.00	–	–	0.157	–	–
P2 (2)	2.00	–	–	0.079	–	–
T	0.30	0.25	0.35	0.012	0.010	0.014
W	24.00	23.70	24.30	0.945	0.933	0.957

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 8. Carrier Tape Outline for LFBGA (Low Profile Fine Pitch BGA) 8 x 12 mm

Drawing is not to scale.

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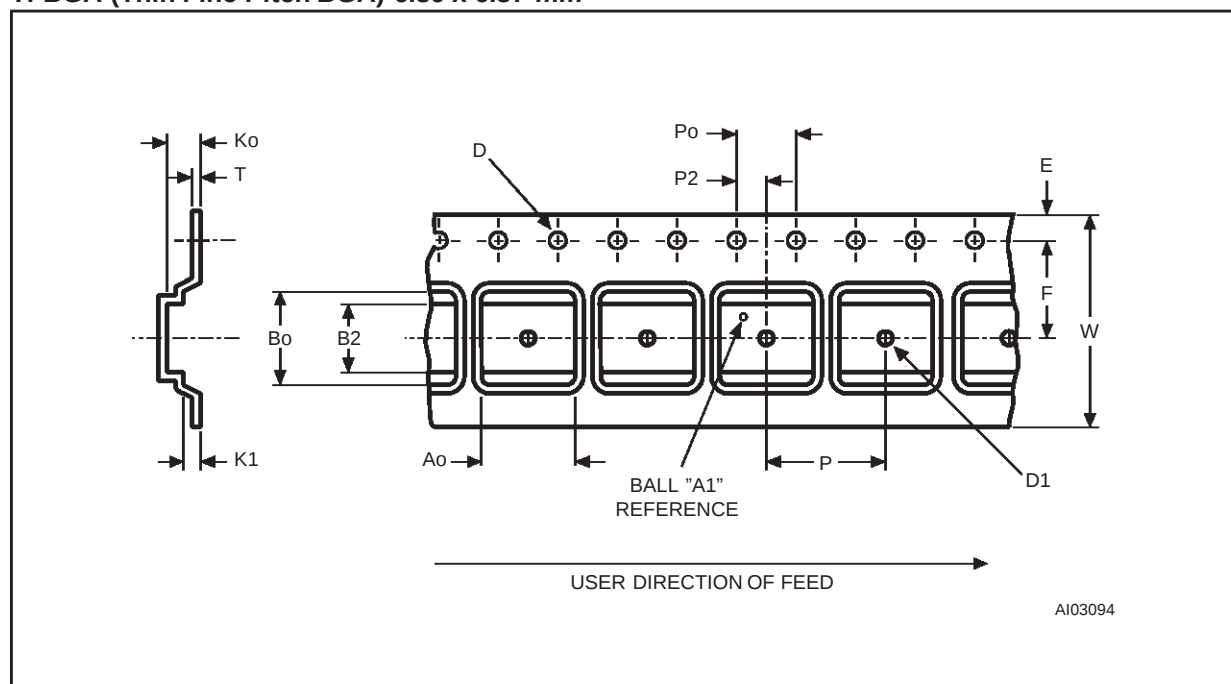
Table 10. Carrier Tape Mechanical Data for μ BGA (Micro Ball Grid Array) and TFBGA (Thin Fine Pitch BGA) 6.39 x 6.37 mm

Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	6.80	6.70	6.90	0.268	0.264	0.272
Bo	6.80	6.70	6.90	0.268	0.264	0.272
B2	5.40	5.30	5.50	0.213	0.209	0.217
$\varnothing$ D	1.50	1.50	1.60	0.059	0.059	0.063
$\varnothing$ D1		1.50			0.059	
E	1.75	1.65	1.85	0.069	0.065	0.073
F (2)	7.50	7.40	7.60	0.295	0.291	0.299
Ko	1.50	1.40	1.60	0.059	0.055	0.063
K1	1.00	0.90	1.10	0.039	0.035	0.043
P	8.00	–	–	0.315	–	–
P0 (1)	4.00	–	–	0.157	–	–
P2 (2)	2.00	–	–	0.079	–	–
T	0.30	0.25	0.35	0.012	0.010	0.014
W	16.00	15.70	16.30	0.630	0.618	0.642

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 9. Carrier Tape Outline for μ BGA (Micro Ball Grid Array) and TFBGA (Thin Fine Pitch BGA) 6.39 x 6.37 mm



Drawing is not to scale.

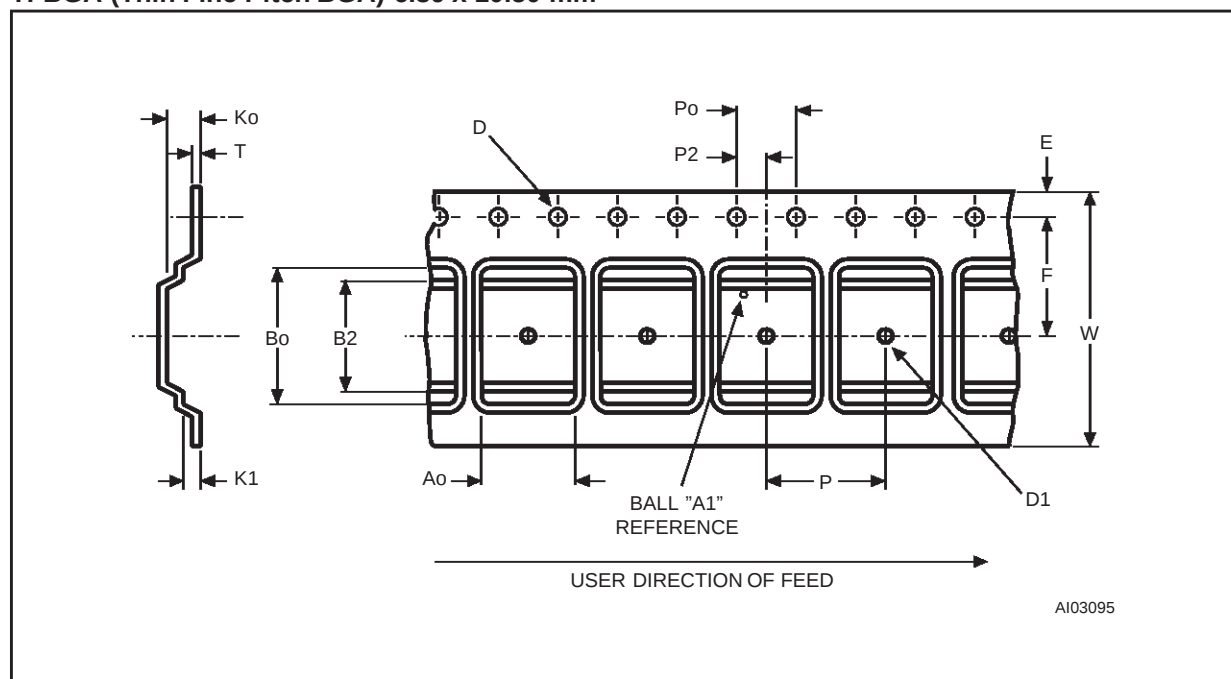
Table 11. Carrier Tape Mechanical Data for μ BGA (Micro Ball Grid Array) and TFBGA (Thin Fine Pitch BGA) 6.39 x 10.50 mm

Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	6.80	6.70	6.90	0.268	0.264	0.272
Bo	11.20	11.10	11.30	0.441	0.437	0.445
B2	9.50	9.40	9.60	0.374	0.370	0.378
$\varnothing$ D	1.50	1.50	1.60	0.059	0.059	0.063
$\varnothing$ D1		1.50			0.059	
E	1.75	1.65	1.85	0.069	0.065	0.073
F (2)	11.50	11.40	11.60	0.453	0.449	0.457
Ko	1.60	1.50	1.70	0.063	0.059	0.067
K1	1.00	0.90	1.10	0.039	0.035	0.043
P	8.00	–	–	0.315	–	–
P0 (1)	4.00	–	–	0.157	–	–
P2 (2)	2.00	–	–	0.079	–	–
T	0.30	0.25	0.35	0.012	0.010	0.014
W	24.00	23.70	24.30	0.945	0.933	0.957

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 10. Carrier Tape Outline for μ BGA (Micro Ball Grid Array) and TFBGA (Thin Fine Pitch BGA) 6.39 x 10.50 mm



Drawing is not to scale.

CSP Tape & Reel

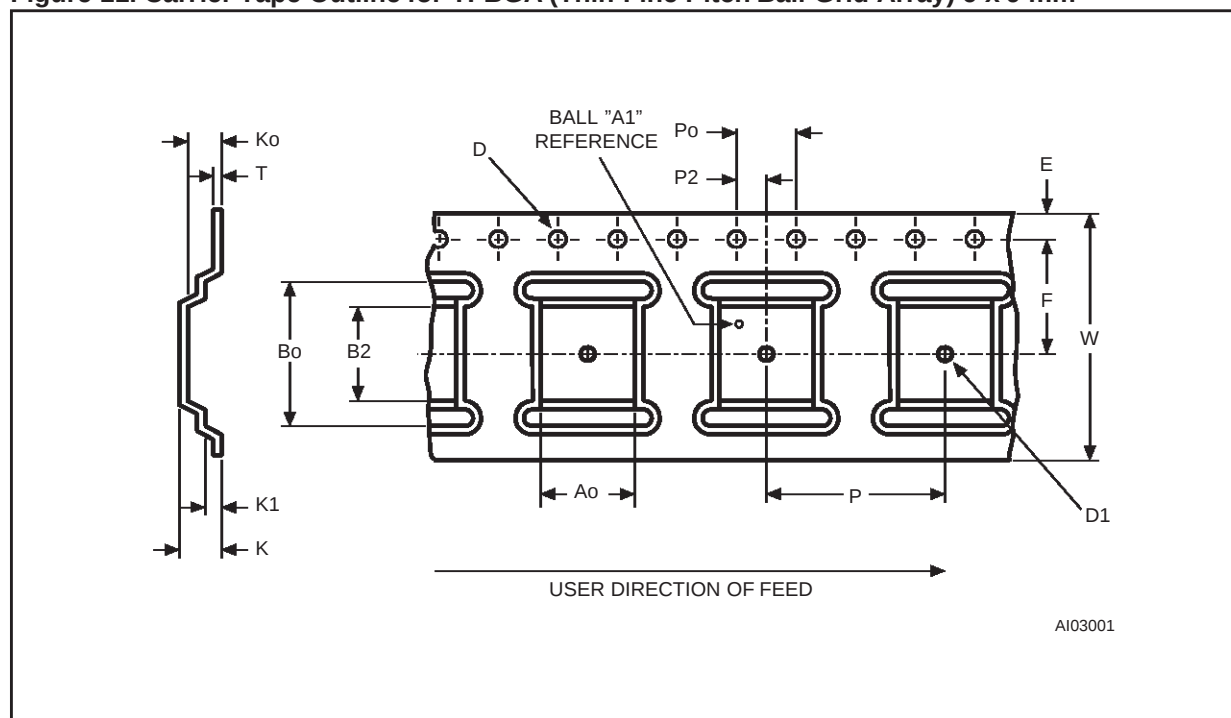
Table 12. Carrier Tape Mechanical Data for TFBGA (Thin Fine Pitch BGA) 6 x 9 mm

Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	6.40	6.30	6.50	0.252	0.248	0.256
Bo	9.40	9.30	9.50	0.370	0.366	0.374
B2	6.60	6.50	6.70	0.260	0.256	0.264
Ø D	1.50	1.50	1.60	0.059	0.059	0.063
Ø D1		1.50	–		0.059	–
E	1.75	1.65	1.85	0.069	0.065	0.073
F ⁽²⁾	7.50	7.40	7.60	0.295	0.291	0.299
K	1.90	1.80	2.00	0.075	0.071	0.079
Ko	2.10	2.00	2.20	0.083	0.079	0.087
K1	1.40	1.30	1.50	0.055	0.051	0.059
P	12.00	–	–	0.472	–	–
P0 ⁽¹⁾	4.00	–	–	0.157	–	–
P2 ⁽²⁾	2.00	–	–	0.079	–	–
T	0.30	0.25	0.35	0.012	0.010	0.014
W	16.00	15.70	16.30	0.630	0.618	0.642

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 11. Carrier Tape Outline for TFBGA (Thin Fine Pitch Ball Grid Array) 6 x 9 mm



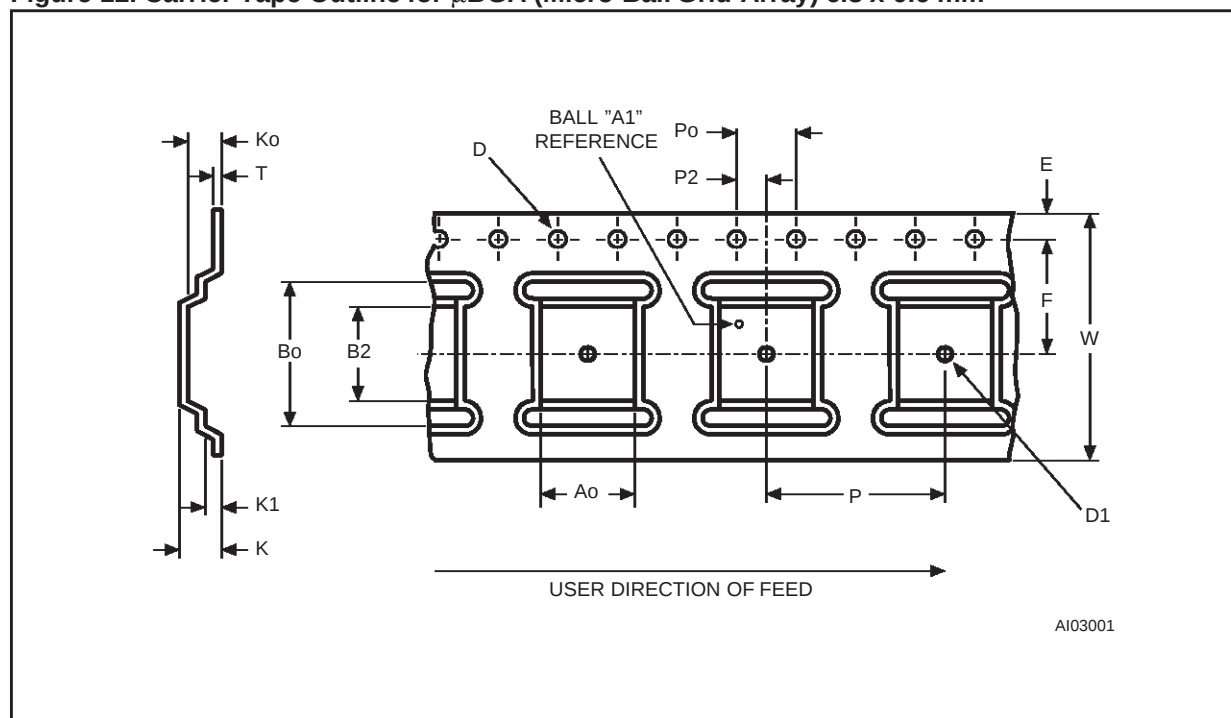
Drawing is not to scale.

Table 13. Carrier Tape Mechanical Data for μ BGA (Micro Ball Grid Array) 6.8 x 9.6 mm

Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	7.20	7.10	7.30	0.283	0.280	0.287
Bo	10.00	9.90	10.10	0.394	0.390	0.398
B2	5.40	5.30	5.50	0.213	0.209	0.217
$\varnothing$ D	1.50	1.50	1.60	0.059	0.059	0.063
$\varnothing$ D1		1.50	–		0.059	–
E	1.75	1.65	1.85	0.069	0.065	0.073
F (2)	7.50	7.40	7.60	0.295	0.291	0.299
K	1.90	1.80	2.00	0.075	0.071	0.079
Ko	1.60	1.50	1.70	0.063	0.059	0.067
K1	0.70	0.60	0.80	0.028	0.024	0.031
P	12.00	–	–	0.472	–	–
P0 (1)	4.00	–	–	0.157	–	–
P2 (2)	2.00	–	–	0.079	–	–
T	0.30	0.25	0.35	0.012	0.010	0.014
W	16.00	15.70	16.30	0.630	0.618	0.642

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 12. Carrier Tape Outline for μ BGA (Micro Ball Grid Array) 6.8 x 9.6 mm

Drawing is not to scale.

CSP Tape & Reel

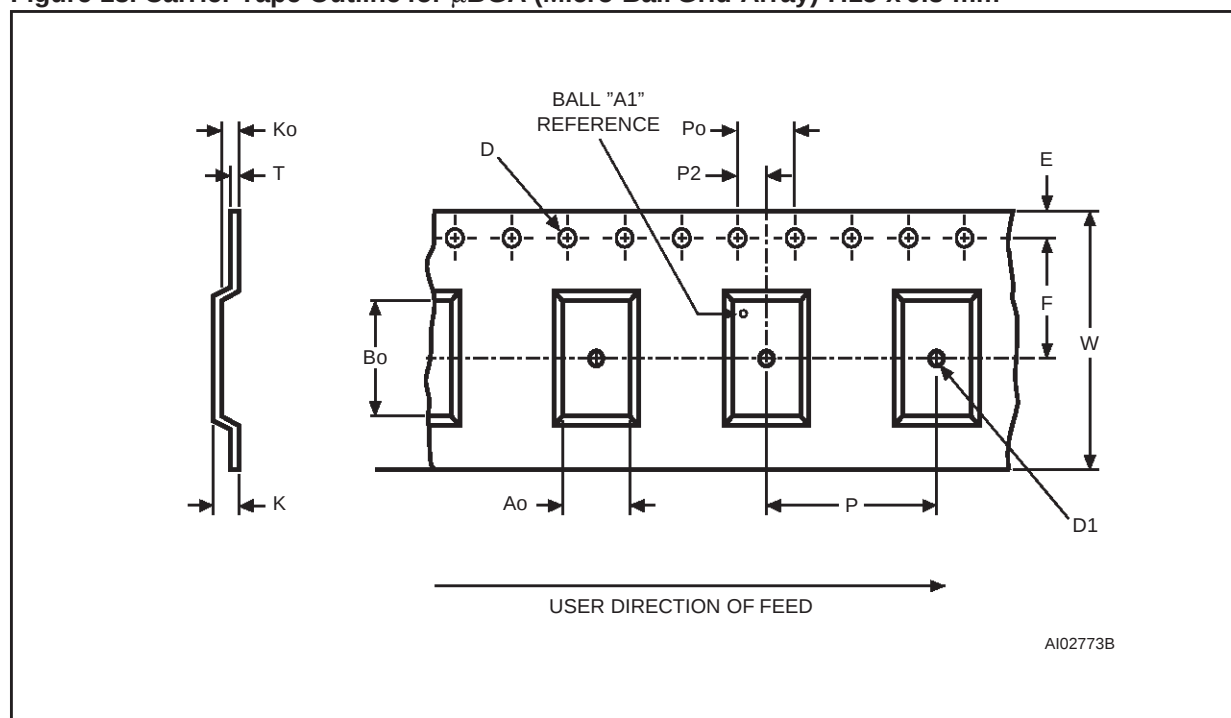
Table 14. Carrier Tape Mechanical Data for μ BGA (Micro Ball Grid Array) 7.15 x 9.3 mm

Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	6.60	6.50	6.70	0.260	0.256	0.264
Bo	8.80	8.70	8.90	0.346	0.343	0.350
$\varnothing D$		1.50	1.60		0.059	0.063
$\varnothing D1$		1.50			0.059	
E	1.75	1.65	1.85	0.069	0.065	0.073
F ⁽²⁾	11.50	11.40	11.60	0.453	0.449	0.457
K	2.00	1.90	2.10	0.079	0.075	0.083
Ko	1.70	1.60	1.80	0.067	0.063	0.071
P	12.00	–	–	0.472	–	–
P0 ⁽¹⁾	4.00	–	–	0.157	–	–
P2 ⁽²⁾	2.00	–	–	0.079	–	–
T	0.30	0.25	0.35	0.012	0.010	0.014
W	24.00	23.70	24.30	0.945	0.933	0.957

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 13. Carrier Tape Outline for μ BGA (Micro Ball Grid Array) 7.15 x 9.3 mm



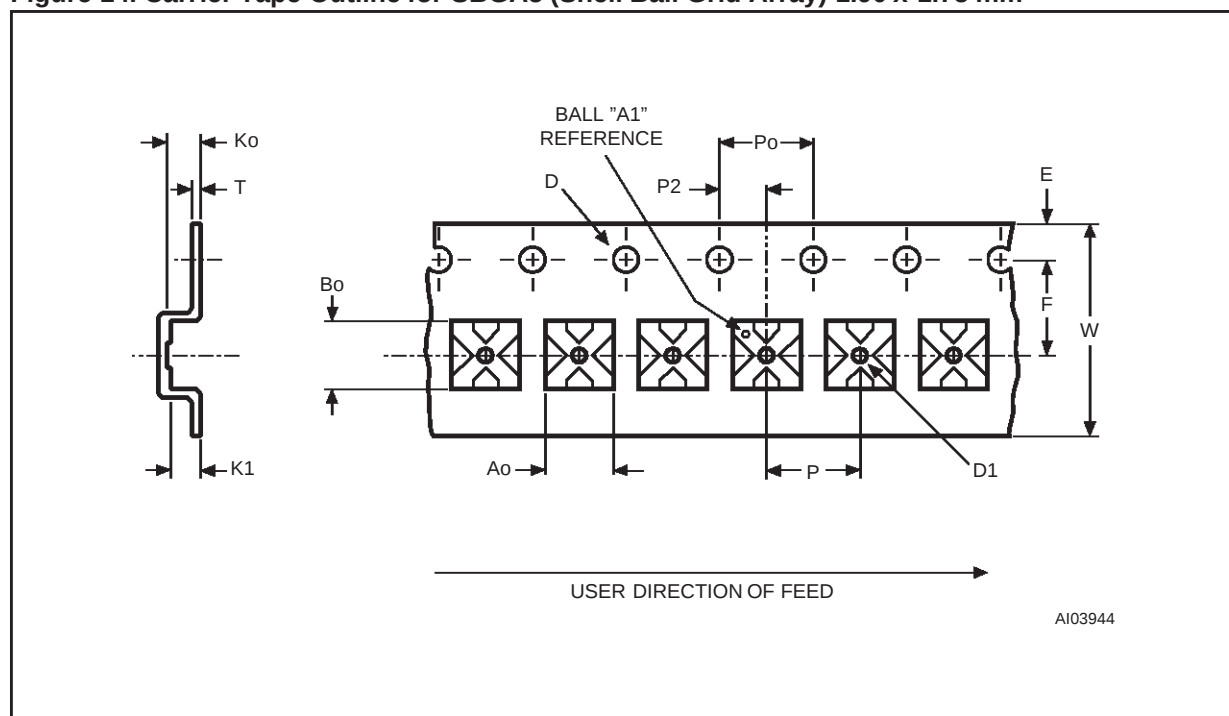
Drawing is not to scale.

Table 15. Carrier Tape Mechanical Data for SBGA5 (Shell Ball Grid Array) 1.90 x 1.75 mm

Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	2.00	1.90	2.10	0.0787	0.0748	0.0827
Bo	2.20	2.10	2.30	0.0866	0.0827	0.0906
Ø D	1.50	1.40	1.60	0.0591	0.0551	0.0630
Ø D1	0.50	0.40	0.60	0.0197	0.0157	0.0236
E	1.75	1.70	1.80	0.0689	0.0669	0.0709
F ⁽²⁾	3.50	3.45	3.55	0.1378	0.1358	0.1398
Ko	1.00	0.90	1.10	0.0394	0.0354	0.0433
K1	0.70	0.60	0.80	0.0276	0.0236	0.0315
P	4.00	—	—	0.1575	—	—
P0 ⁽¹⁾	4.00	—	—	0.1575	—	—
P2 ⁽²⁾	2.00	—	—	0.0787	—	—
T	0.20	—	—	0.0079	—	—
W	8.00	7.90	8.10	0.3150	0.3110	0.3189

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 14. Carrier Tape Outline for SBGA5 (Shell Ball Grid Array) 1.90 x 1.75 mm

Drawing is not to scale.

CSP Tape & Reel

Table 16. Carrier Tape Mechanical Data for SBGA8 (Shell Ball Grid Array) 1.745 x 1.965 mm

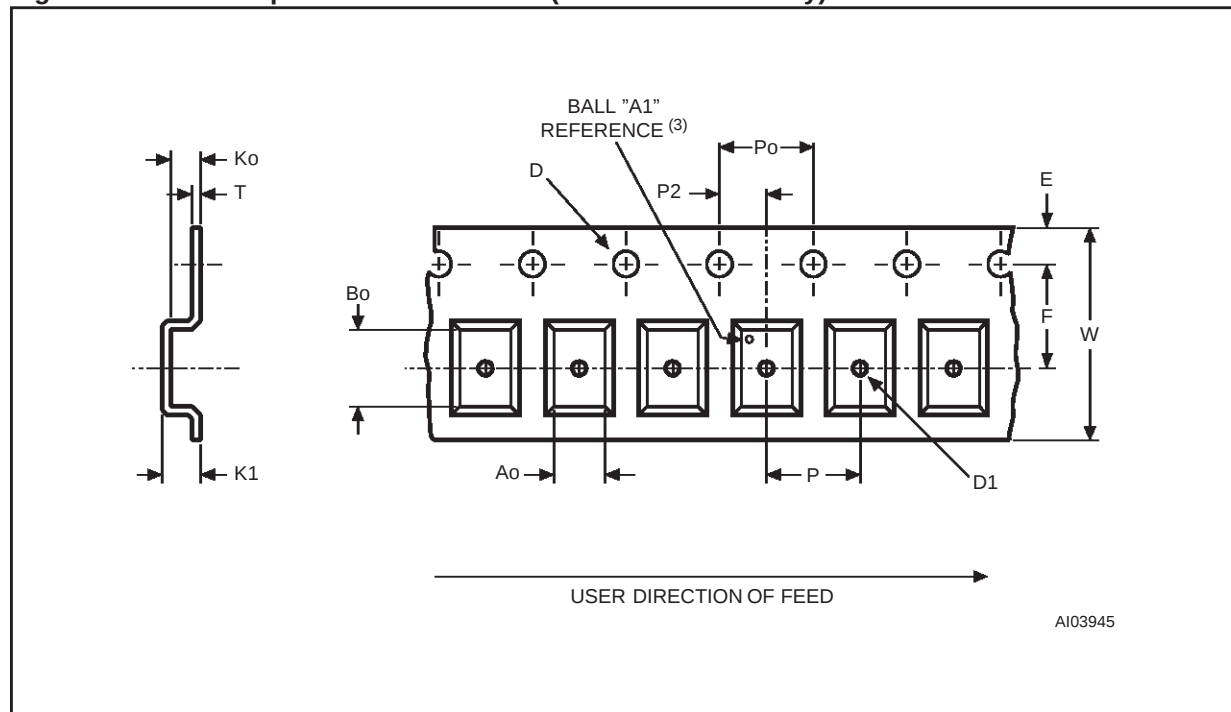
Symbol	millimeters			inches		
	Typ	Min	Max	Typ	Min	Max
Ao	1.87	1.82	1.92	0.0736	0.0717	0.0756
Bo	2.09	2.04	2.14	0.0823	0.0803	0.0843
Ø D	1.50	1.40	1.60	0.0591	0.0551	0.0630
Ø D1	0.50	0.40	0.60	0.0197	0.0157	0.0236
E	1.75	1.70	1.80	0.0689	0.0669	0.0709
F ⁽²⁾	3.50	3.45	3.55	0.1378	0.1358	0.1398
Ko	0.75	0.65	0.85	0.0295	0.0256	0.0335
K1	1.00	—	—	0.0394	—	—
P	4.00	—	—	0.1575	—	—
Po ⁽¹⁾	4.00	—	—	0.1575	—	—
P2 ⁽²⁾	2.00	—	—	0.0787	—	—
T	0.254	0.234	0.274	0.0100	0.0092	0.0108
W	8.00	7.90	8.30	0.3150	0.3110	0.3286

Note: 1. 10 Sprocket hole pitch cumulative tolerance ± 0.02 mm.

2. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

3. Ball "A1" reference hole available on request.

Figure 15. Carrier Tape Outline for SBGA8 (Shell Ball Grid Array) 1.745 x 1.965 mm



Drawing is not to scale.

Table 17. Revision History

Date	Revision Details
April 1999	First Issue
10/20/99	Title change (Figure 4) Disclaimer change
11/2/99	LFPGA 6x9 mm drawings and mechanical data change (Table 6, Figure 5)
11/17/99	LFPGA 7x12 mm added (Table 7, Figure 6), LFPGA 7x7 mm added (Table 8, Figure 7), μPGA 6.4 x 6.4 mm added (Table 10, Figure 9), μPGA 6.4 x 10.5 mm added (Table 11, Figure 10) Min and Max value added (Tables 5, 6, 13, 14)
04/12/00	Table Reference on Table 1 Dimension changed (Table 10 and 11)
07/31/00	LFPGA 8x12 Tape added (Table 9, Figure 8)
09/18/00	SBGA5 and SBGA8 Tape added (Tables 15 and 16, Figures 14 and 15)
09/26/00	μPGA Tape valid for TFBGA also (Tables 10 and 11, Figures 9 and 10)
10/13/00	SBGA5 and SBGA8 Tape updated (Tables 15 and 16, Figures 14 and 15)
10/21/00	TFBGA 6x9 Tape added (Table 12, Figure 11)

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