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TN1204
Technical note

Tape and reel shipping media for STM32 microcontrollers in BGA packages

Introduction

BGA packages can be supplied in tape and reel shipping media.

The reels have a 13” typical diameter. The types of reel used are in plastic either anti static or conductive, with a black conductive cavity tape. The cover tape is transparent anti static or conductive.

The devices are positioned in the cavities with the identifying pin (normally Pin “1”) on the same side as the sprocket holes in the tape.

STMicroelectronics tape and reels are compliant with EIA 481 and IEC 60286-3 standard specifications.

Table 1 lists the BGA packages available for STM32 microcontrollers, as well as the corresponding shipping media.

Table 1. BGA packages available in tape and reel packing

Package	Description	Package code	Reel diameter	Tape width	Tape pitch
UFBGA 10x10	UFBGA 10X10 144 balls, 0.8 mm pitch	A02Y	13”	24 mm	16 mm
UFBGA 10x10	UFBGA 10X10X0.6 176+25 balls, 0.65 mm pitch	A0E7		24 mm	16 mm
LFBGA 10x10	LFBGA 10x10x1.7 100 balls, F10x10, 0.8 mm pitch	H0		24 mm	16 mm
LFBGA 10x10	LFBGA 10x10x1.7, 144 balls, F12x12, 0.8 mm pitch	X3		24 mm	16 mm
TFBGA 13x13	TFBGA 13X13X1.2, 216 balls, 0.8 mm pitch	A0L2		24 mm	16 mm
UFBGA 5x5	UFBGA 5X5X0.6 64 balls, 0.5 mm pitch	A019		12 mm	8 mm
TFBGA 5x5	TFBGA 5x5x1.2 64 F8x8 0.5 mm pitch	R8		12 mm	8 mm
LFBGA 6x6	LFBGA 6x6x1.7, 36 balls, 6F, 0.8 mm pitch	AL		24 mm	16 mm
UFBGA 7x7	UFBGA 7x7x0.60, 144 balls, R12sq, 0.5 mm pitch	A0AS		16 mm	12 mm
UFBGA 7x7	UFBGA 7x7x0.60, 100 balls, R12sq, 0.5 mm pitch	A0C2		16 mm	12 mm
UFBGA 7x7	UFBGA 7X7X0.6, 132 balls, 0.5 mm pitch, R 12X12	A0G8		16 mm	12 mm
UFBGA 7x7	UFBGA 7X7X0.6, 169 balls, 0.5 mm pitch	A0YV		16 mm	12 mm
LFBGA 8x8	LFBGA 8x8x1.7, 64 balls, 8F, 0.8 mm pitch	AH		16 mm	12 mm

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1 Reel description

Figure 1. Reel diagram

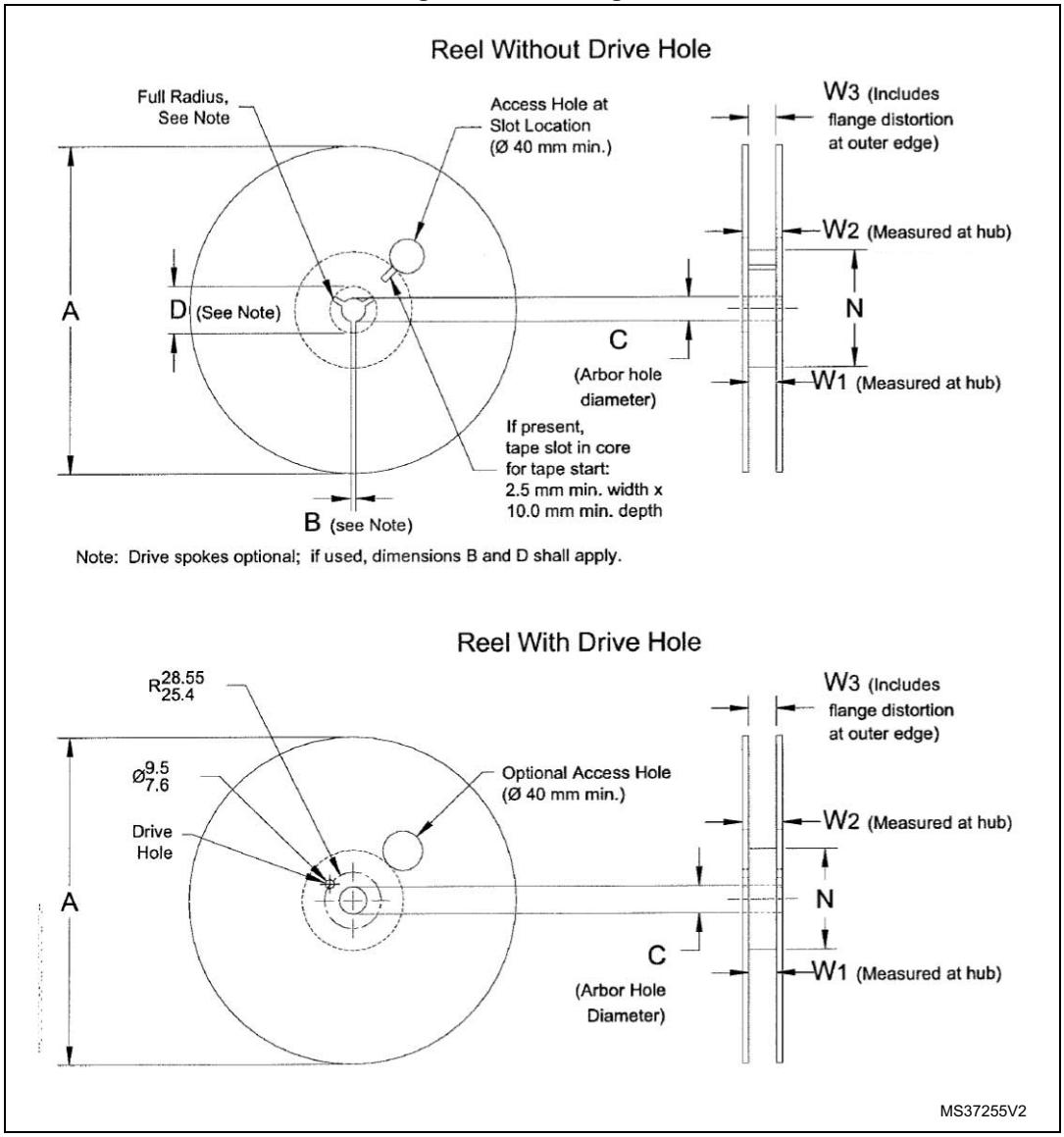


Table 2. Reel dimensions(1)

Reel size (inch)	Tape size (mm)	A max. (mm)	Reeds without drive hole			Reeds with drive hole			N(mm)	W1(mm)(2)	W2 max.(mm)
			B min. (mm)	C (mm)	D min.(mm)	B min.(mm)	C max.(mm)	D min.(mm)			
13	12	330	1.5	13.0+0.5/-0.2	20.2	NA	29.2	NA	100	12.4+2/-0	18.4
									178±5		
	16								100	16.4+2/-0	22.4
									178±5		
	24								100	24.4+2/-0	30.4
									178		

1. NA stands for “not applicable”.
2. W1 is measured at the hub.

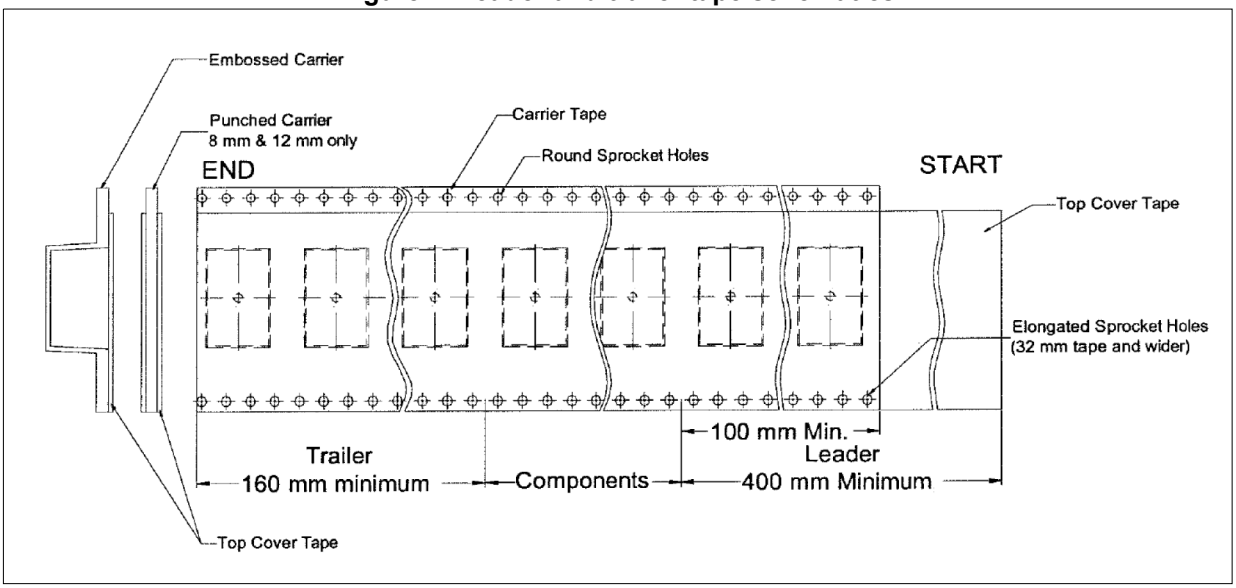
2 Leader and trailer tape specifications

The leader has a minimum width of 400 mm which includes at least 100 mm of carrier tape with empty cavities and sealed cover tape (see *Figure 2*). The leader tape is affixed to the last turn of carrier tape by using a transparent adhesive anti static or paper based tape of a width not higher than the one of the cover tape.

The trailer is a carrier tape which minimum width is 160 mm with empty cavities and sealed cover tape, as shown in *Figure 2*. The trailer tape must be affixed to the reel by using the tape slot of the reel hub.

During the unwinding operation, the entire carrier tape must be easily released from the reel hub as the last portion of the tape unwinds from the reel without damaging the carrier tape and the remaining components in the cavities.

Figure 2. Leader and trailer tape schematics



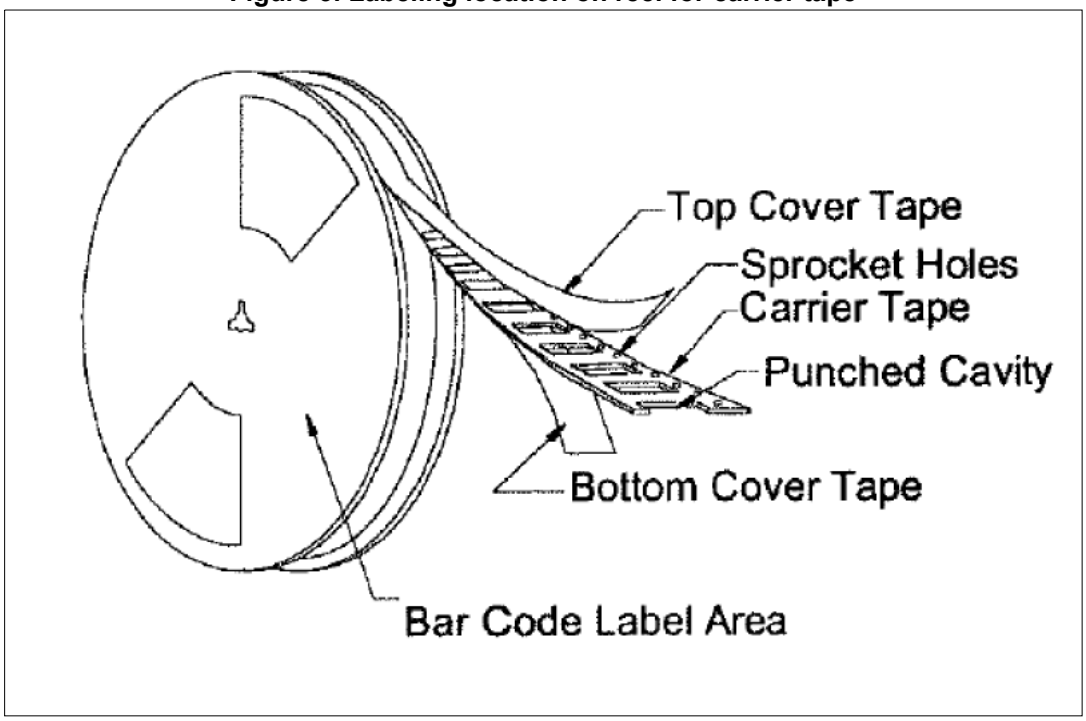
3 Labeling

STMicroelectronics “inner box” standard label is placed on each reel at the following locations:

- On the box that directly holds the reel
- On the damp proof bag if the units are dry packed
- On the reel itself

  The label is attached to the flange that is facing the user when the tape is extracted from the reel at the top right (see *Figure 3*).

Figure 3. Labeling location on reel for carrier tape

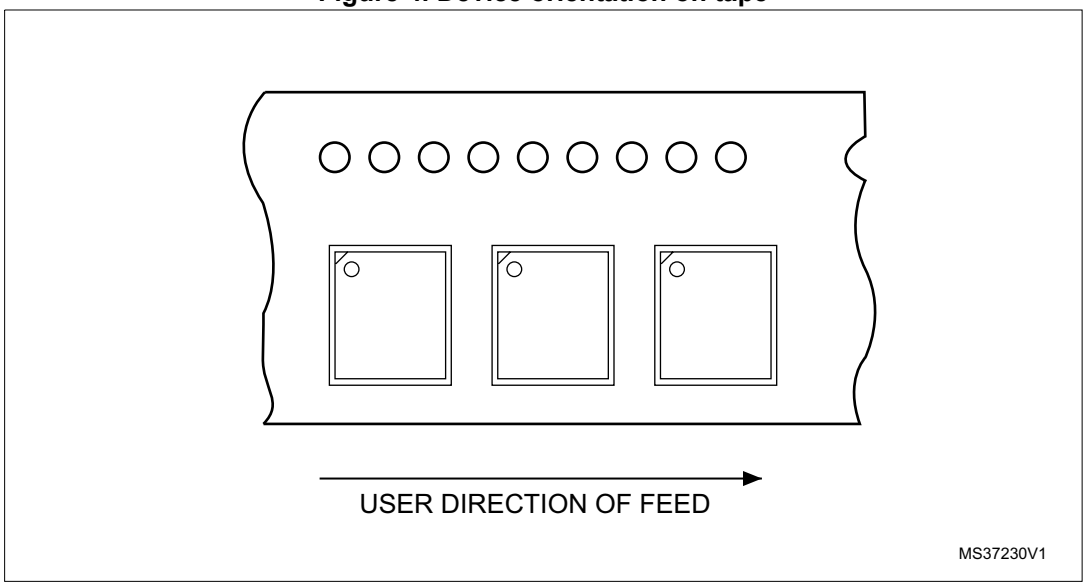


4 Device Orientation

The largest axis of the component outline is perpendicular to the tape length.

The device is positioned in the carrier tape cavity as shown in *Figure 4: Device orientation on tape*. Ball 1 is located on the top left corner of the package.

Figure 4. Device orientation on tape



5 Carrier tape mechanical dimensions

Possible widths are 12, 16 and 24 mm (refer to *Table 1: BGA packages available in tape and reel packing*).

Figure 5. Embossed carrier tape

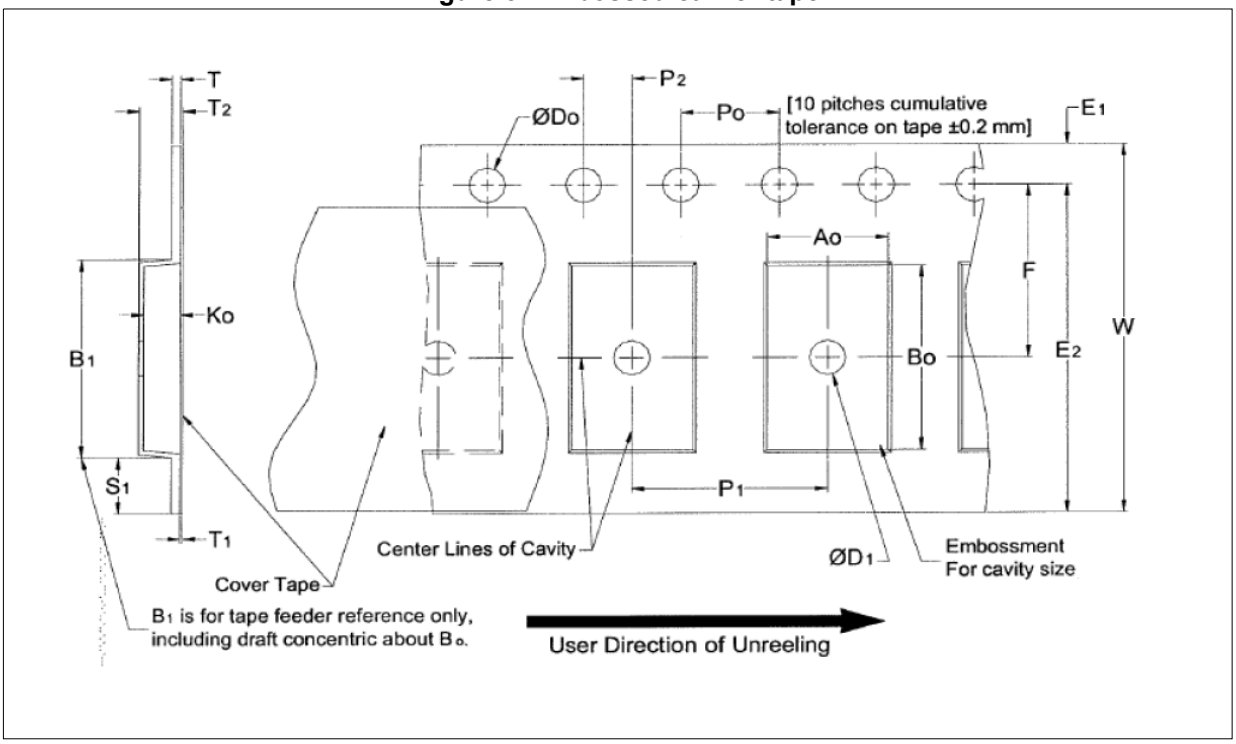


Table 3. Carrier tape constant dimensions

Tape width	D0	D1 min	E1	P0	P2	R(1)	S1	T max.	T1 max.	Unit
12 mm	1.5+0.1-0.0	1.5	1.75±0.1	4.0±0.1	2.0±0.05	30	0.6	0.6	0.1	mm
16 mm					2.0±0.1					
24 mm										

1. The maximum radius the tape with or without components can bend without damage is specified in *Section 6: Bending radius requirements*).

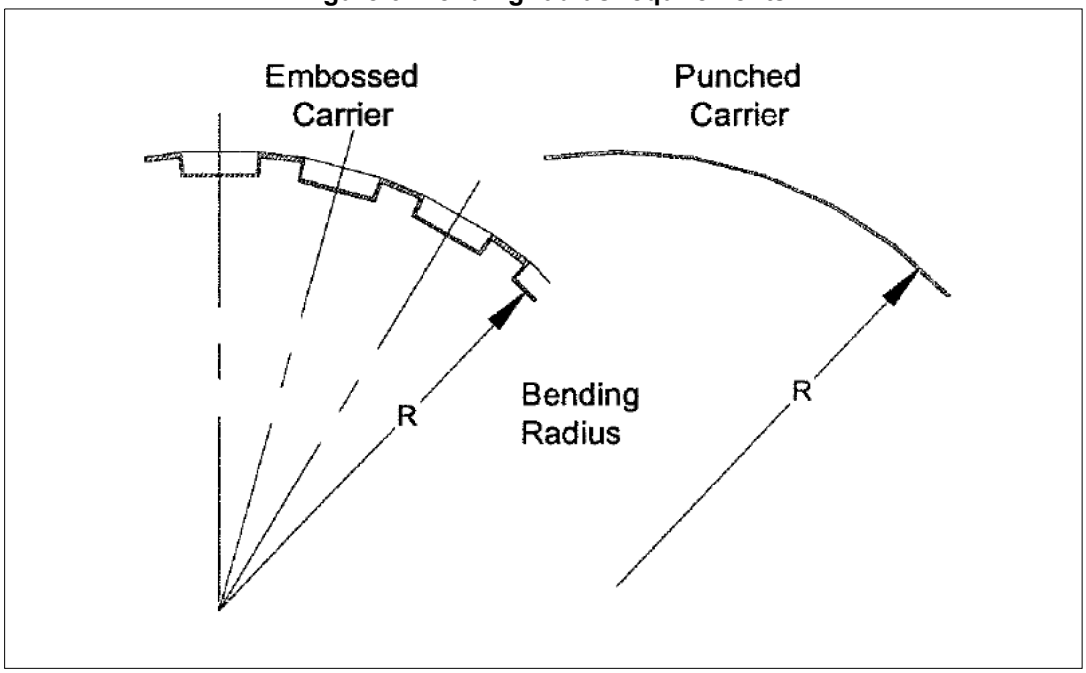
Table 4. Carrier tape variable dimensions

Tape width	B1	E2	F	P1	T2 max.	W max.	A0, B0, K0	Unit
12 mm	8.2	10.25	5.5±0.05	2.0±0.05 or 4.0±0.1 or 8.0±0.1	6.5	12.3	See (1)	mm
16 mm	12.1	14.25	7.5±0.1	4.0±0.1 to 12.0±0.1 by 4.0 increments	8.0	16.3		
24 mm	20.1	22.25	11.5±0.1	4.0±0.1 to 20.0±0.1 by 4.0 increments	12.0	24.3		

1. The cavity defined by A0, B0 and K0 surrounds the component with sufficient clearance so that:
   - The component does not protrude above the top surface of the carrier tape.
   - The component can be removed vertically from the cavity without mechanical restriction, after the top cover tape has been removed.
   - Rotation of the component is limited to 20° maximum for 12 mm tapes and to 10° maximum for 16 mm and 24mm tapes.
   - Lateral movements of the component are restricted to 0.5 mm maximum for 12 mm tapes and to 1.0 mm maximum for 16 mm and 24 mm tapes.

6 Bending radius requirements

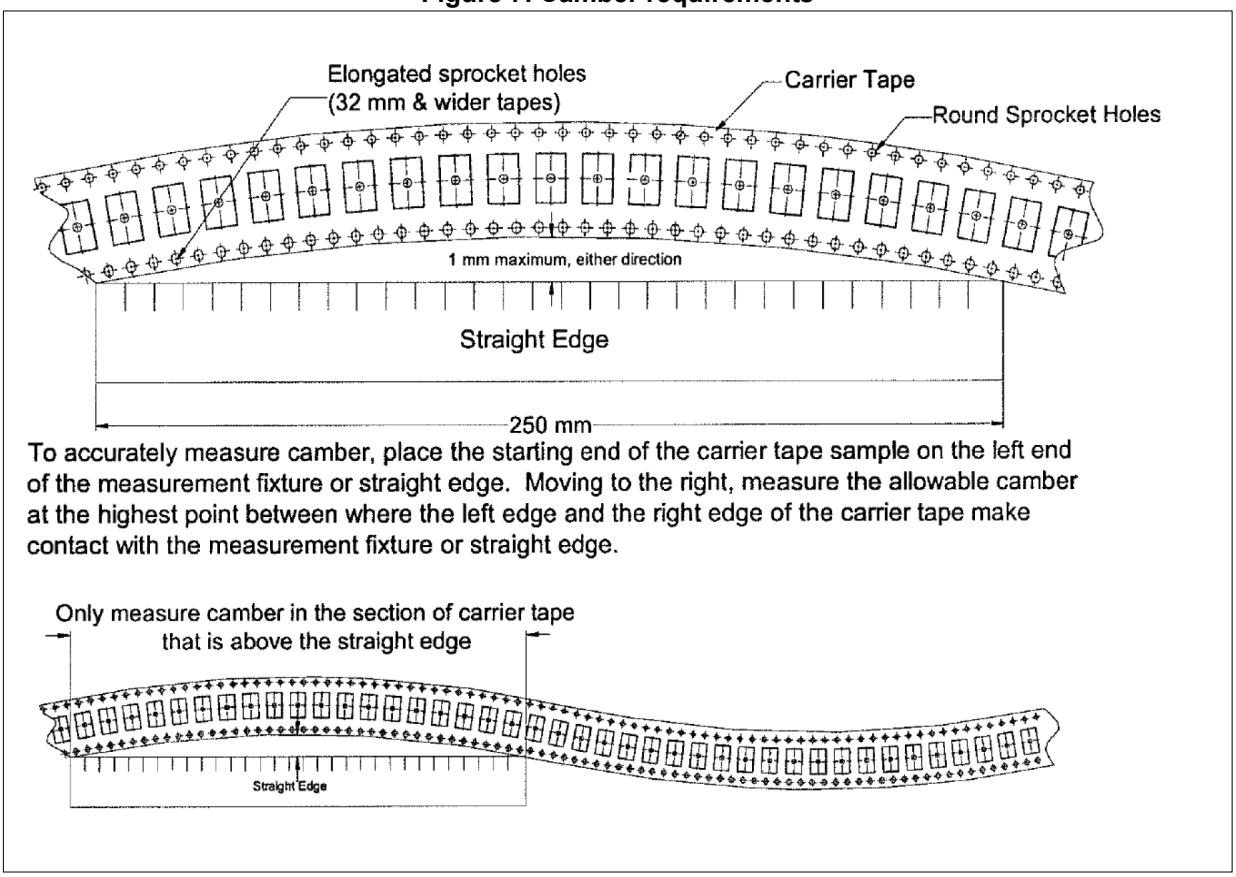
Figure 6. Bending radius requirements



7 Camber requirements

Carrier camber should not exceed more than 1 mm in 250 mm of carrier tape length.

Figure 7. Camber requirements



8 Revision history

Table 5. Document revision history

Date	Revision	Changes
16-Feb-2015	1	Initial release.
19-Feb-2015	2	Updated *Figure 1: Reel diagram*, *Figure 2: Leader and trailer tape schematics* and *Figure 5: Embossed carrier tape* to remove reference to notes.