



CML Tape & Reel Specification

MQSE6

Issue 9

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1. Scope

The specification relates to the tape packaging of integrated circuits suitable for “surface mount” assembly.

It includes only those dimensions that are essential for the purchaser to use this product.

2. Dimensions

(Refer to figure 1a & 1b)

2.1. Tape Width (W)

Package style Q5, Q8, QT8, A4	W =	12.0 +0.3/-0.1	mm
Q6, Q7, QF, QH, A7	W =	12.0 ± 0.3	mm
D4, D5, D6 E1, E2, E3, E4 L4, Q2, Q3, Q4	W =	16.0 ± 0.3	mm
Q1, QT1, T1	W =	16.0 +0.3/-0.1	mm
D1, D2, D3 L1, L2, L7, L8, L9, B1	W =	24.0 ± 0.3	mm
L6	W =	32.0 ± 0.3	mm

2.2. Carrier Tape Thickness (t)

All D's, E's, L's, Q's, A7 B1	t =	0.30 ± 0.5	mm	max
A4	t =	0.25 ± 0.5	mm	max

2.3. Pitch of Sprocket Holes (P₀)

All package styles	P ₀ =	4.0 ± 0.2	mm
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2.4. Diameter of Sprocket Holes (D)

All package styles	D =	1.5 + 0.1/- 0.0	mm
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2.5. Distance Sprocket Hole Centre to Tape Edge (E)

All package styles	E =	1.75 ± 0.1	mm
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2.6. Distance Sprocket Hole Centre to Centre Hole (F)

Package style Q5, Q6, Q7 Q8, QT8, QH, QF, A4, A7	F =	5.5 ± .05	mm
D4, D5, D6 E1, E2, E3, E4 L4	F =	7.5 ± 0.1	mm

Q1, QT1, Q2, Q3, Q4
T1

D1, D2, D3 F = 11.5 ± 0.1 mm
L1, L2, L7, L8, L9, B1

L6 F = 14.2 ± 0.1 mm

2.7. Distance between centres if two rows of sprocket holes (S)

Package Style

L6 S = 28.4 ± 0.1 mm

2.8. Distance between oval hole centres (d)

Package Style

L6 d = 0.2 ± 0.05 mm

2.9. Radius of oval holes

Package Style

L6 r = 0.75 mm

2.10. Dimension (P₂)

All package styles P₂ = 2.0 ± 0.1 mm

2.11. Embossed Pocket Dimensions (A₀ & B₀)

Package style

D1 A₀ = 10.9 ± 0.1 mm

B₀ = 18.3 ± 0.1 mm

D2 A₀ = 10.9 ± 0.1 mm

B₀ = 15.8 ± 0.1 mm

D3 A₀ = 10.9 ± 0.1 mm

B₀ = 13.2 ± 0.1 mm

D4 A₀ = 10.9 ± 0.1 mm

B₀ = 10.7 ± 0.1 mm

D5 A₀ = 8.2 ± 0.1 mm

B₀ = 8.8 ± 0.1 mm

D6 A₀ = 8.4 ± 0.1 mm

B₀ = 10.7 ± 0.1 mm

E1 A₀ = 6.8 ± 0.1 mm

B₀ = 10.2 ± 0.1 mm

E2 A₀ = 6.95 ± 0.1 mm

B₀ = 8.3 ± 0.1 mm

E3 A₀ = 6.8 ± 0.1 mm

B₀ = 6.9 ± 0.1 mm

E4 A₀ = 6.8 ± 0.1 mm

B₀ = 5.4 ± 0.1 mm

L1 A₀ = 15.8 ± 0.1 mm

B₀ = 15.8 ± 0.1 mm

L2 A₀ = 11.5 ± 0.1 mm

B₀ = 11.5 ± 0.1 mm

L4 A₀ = 9.3 ± 0.1 mm

B₀ = 9.3 ± 0.1 mm

L6 A₀ = 18.0 ± 0.1 mm

B₀ = 18.0 ± 0.1 mm

L7	A0 =	12.5 ± 0.1	mm
	B0 =	12.5 ± 0.1	mm
L8	A0 =	16.5 ± 0.1	mm
	B0 =	16.5 ± 0.1	mm
L9	A0 =	12.5 ± 0.1	mm
	B0 =	12.5 ± 0.1	mm
Q1, QT1	A0 =	9.3 ± 0.1	mm
	B0 =	9.3 ± 0.1	mm
Q2	A0 =	8.3 ± 0.1	mm
	B0 =	8.3 ± 0.1	mm
Q3, T1	A0 =	7.25 ± 0.1	mm
	B0 =	7.25 ± 0.1	mm
Q4	A0 =	6.3 ± 0.1	mm
	B0 =	6.3 ± 0.1	mm
Q5, Q8, QT8	A0 =	5.25 ± 0.1	mm
	B0 =	5.25 ± 0.1	mm
Q6, Q7, QH	A0 =	4.35 ± 0.1	mm
	B0 =	4.35 ± 0.1	mm
QF	A0 =	3.30 ± 0.1	mm
	B0 =	3.30 ± 0.1	mm
B1	A0 =	10.3 ± 0.1	mm
	B0 =	10.3 ± 0.1	mm
A4	A0 =	3.42 ± 0.05	mm
	B0 =	3.50 ± 0.05	mm
A7	A0 =	4.30 ± 0.1	mm
	B0 =	4.30 ± 0.1	mm

2.12. Embossed Tape Dimension (K0)

Package style			
D1, D2, D3, D4	K0 =	3.0 ± 0.1	mm
D5	K0 =	2.5 ± 0.1	mm
D6	K0 =	2.4 ± 0.1	mm
E1, E2, E3, E4	K0 =	1.6 ± 0.1	mm
L1	K0 =	2.9 ± 0.1	mm
L2	K0 =	4.1 ± 0.1	mm
L6	K0 =	4.9 ± 0.1	mm
L4, L7, L9	K0 =	2.2 ± 0.1	mm
L8	K0 =	1.9 ± 0.1	mm
Q1	K0 =	1.1 ± 0.1	mm
QT1	K0 =	1.1 ± 0.1	mm
Q2	K0 =	1.1 ± 0.1	mm
Q3	K0 =	1.1 ± 0.1	mm
Q4	K0 =	1.1 ± 0.1	mm
Q5, Q8, QT8	K0 =	1.1 ± 0.1	mm
Q6, Q7, QH	K0 =	1.1 ± 0.1	mm
QF	K0 =	1.1 ± 0.1	mm
T1	K0 =	1.3 ± 0.1	mm
B1	K0 =	2.1 ± 0.1	mm
A4	K0 =	0.82 ± 0.05	mm
A7	K0 =	1.40 ± 0.1	mm

2.13. Pitch of Component Pockets (P1)

Package style			
E1, E2, E3, E4	P1 =	8.0 ± 0.1	mm
Q5, Q6, Q7, Q8, QT8			
QF, QH, A4, A7			

D1, D2, D3, D4 D5, D6 L4, T1 Q1, QT1, Q2, Q3, Q4	P1 =	12 ± 0.1	mm
L2, L7, L9, B1	P1 =	16 ± 0.1	mm
L1, L8	P1 =	20 ± 0.1	mm
L6	P1 =	24 ± 0.1	mm

2.14 Outside Dimension of Pocket (B1)

Package style			
D1	B1 =	18.9 ± 0.2	mm
D2	B1 =	16.5 ± 0.2	mm
D3	B1 =	13.9 ± 0.2	mm
D4	B1 =	11.4 ± 0.2	mm
D5	B1 =	9.3 ± 0.2	mm
D6	B1 =	11.4 ± 0.2	mm
E1	B1 =	10.9 ± 0.2	mm
E2	B1 =	9.0 ± 0.2	mm
E3	B1 =	7.6 ± 0.2	mm
E4	B1 =	6.3 ± 0.2	mm
L1	B1 =	16.5 ± 0.2	mm
L2	B1 =	12.2 ± 0.2	mm
L4	B1 =	9.9 ± 0.2	mm
L6	B1 =	18.8 ± 0.2	mm
L7	B1 =	13.0 ± 0.2	mm
L8	B1 =	17.1 ± 0.2	mm
L9	B1 =	13.0 ± 0.2	mm
Q1, QT1	B1 =	10.4 ± 0.2	mm
Q2	B1 =	9.4 ± 0.2	mm
Q3, T1	B1 =	8.4 ± 0.2	mm
Q4	B1 =	7.4 ± 0.2	mm
Q5, Q8, QT8	B1 =	6.4 ± 0.2	mm
Q6, Q7, QH	B1 =	5.4 ± 0.2	mm
QF	B1 =	4.4 ± 0.2	mm
B1	B1 =	11.4 ± 0.2	mm
A4	B1 =	4.6 ± 0.2	mm
A7	B1 =	5.4 ± 0.2	mm

2.15 Pocket Centre Hole Diameter (D1)

Package style	
D1, D2, D3, D4, D5, D6	
E1, E2, E3, E4	
L1, L2, L4, L6, L7, L8, L9	D1 = 1.5mm Minimum
Q1, QT1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, QT8, QF, QH, T1, B1, A4, A7	

3. Materials.

- 3.1. Carrier tape to be made of a conductive grade of polystyrene.
- 3.2. Conductive grade polycarbonate is also an approved carrier tape material and may be used under certain circumstances.
- 3.3. Temperature sealed cover tape is an anti static grade of PET/PE film.

4. Polarity & Orientation of Components in Tape

- 4.1. All components are placed such that pin 1 is adjacent to the sprocket holes (See figures 6a, 6b, 6c, 6d, 6e & 6f)
- 4.2. The mounting side of the component is oriented to the bottom side of the tape (See Figure 2).

5. Fixing of Components in Tape

- 5.1. The cover tape shall not cover the sprocket holes in the carrier tape
- 5.2. Tapes in adjacent layers shall not stick together in the packing.
- 5.3. The adhesive of the cover tape shall not adversely affect the mechanical and electrical characteristics and the marking of the component.
- 5.4. Components will not stick to the carrier tape or the cover tape.
- 5.5. The tapes shall be suitable to withstand storage of the taped components without danger of migration of the terminations or the giving off of vapours, which would impair soldering or deteriorate the component properties or termination by chemical action.
- 5.6. When the tape is bent with a minimum radius (See Figure 5), the tape shall not be damaged and the components shall remain in their position and orientation in the tape.
- 5.7. The peel strength of the cover tape shall be 60 + 40/-30 grams measured at 175° – 180° with respect to the carrier tape along its longitudinal axis. The peel speed shall be 300mm/min.
- 5.8. After baking at 50°C for 60 hours or storage in ideal conditions for three months the peel strength shall remain within the specified limits.

6. Packaging

- 6.1. The tape will be wound on anti-static high impact polystyrene reels (See Figure 4).

6.1.1 13" Reel Dimensions (in millimetres)

W Tape Width	A Reel Dia.	C Centre Hole Dia.	N Hub Outer Dia.	W1 Inside Cheek Width	W2 Outside Cheek Width	Product types
12	330	13	101	12.8	17.3	All
16	330	13	101	16.8	21.3	All
24	330	13	101	24.8	29.3	All except L8
24	330	13	175	24.8	29.3	L8 only
32	330	13	101	32.8	37.3	All

6.1.2 7" Reel Dimensions (in millimetres)

W Tape Width	A Reel Dia.	C Centre Hole Dia.	N Hub Outer Dia.	W1 Inside Cheek Width	W2 Outside Cheek Width	Product types
12	180	13	60	13	15.4	Q5, Q6, Q7, Q8, QT8, QF, QH, A4, A7
16	180	13	60	17	19.4	E1, E2, E3, E4 Q1,QT1, Q2,Q3,Q4

- 6.2. There will be a leader of a minimum of 400 mm of covered empty compartments.
- 6.3. In no case shall there be two or more consecutive components missing. The maximum number of missing components per reel shall be one or 0.1% whichever is greater.
- 6.4. At the end of the tape, there will be a trailer of a minimum of 160 mm of sealed empty pockets.
- 6.5. The tape shall release from the reel hub as the last portion of the carrier tape unwinds from the reel.
- 6.6. Standard numbers of components on reels:

7" Reel**13" Reel**

Package style		Minimum Quantity	Maximum Quantity	Package style		Minimum Quantity	Maximum Quantity
D1	=	-	-	D1	=	1,000	1,500
D2	=	-	-	D2	=	1,000	1,500
D3	=	-	-	D3	=	1,000	1,500
D4	=	-	-	D4	=	1,000	1,500
D5	=	-	-	D5	=	1,000	-
D6	=	-	-	D6	=	1,000	-
E1	=	-	1,000	E1	=	-	3,000
E2	=	-	1,000	E2	=	-	3,000
E3	=	-	1,000	E3	=	-	3,000
E4	=	-	1,000	E4	=	-	3,000
L1	=	-	-	L1	=	500	-
L2	=	-	-	L2	=	500	-
L4	=	-	-	L4	=	1,000	-
L6	=	-	-	L6	=	500	500
L7	=	-	-	L7	=	1,000	-
L8	=	-	-	L8	=	1,000	-
L9	=	-	-	L9	=	1,000	-
Q1	=	-	1,000	Q1	=	-	3,500
QT1	=	-	1,000	QT1	=	-	3,500
Q2	=	-	1,000	Q2	=	-	3,500
Q3	=	-	1,000	Q3	=	-	3,500
Q4	=	-	1,000	Q4	=	-	3,500
Q5	=	-	1,000	Q5	=	-	5,000
Q6	=	-	1,000	Q6	=	-	5,000
Q7	=	-	1,000	Q7	=	-	5,000
Q8	=	-	1,000	Q8	=	-	5,000
QT8	=	-	1,000	QT8	=	-	5,000
QF	=	-	1,000	QF	=	-	5,000
QH	=	-	1,000	QH	=	-	5,000
T1	=	-	-	T1	=	1,000	3,500
A4	=	-	1,000	A4	=	-	5,000
A7	=	-	1,000	A7	=	-	4,500
B1	=	-	-	B1	=	1,000	1,500

- 6.7 The tape will be prevented from unreeling by winding a tape around the reel and fixing with adhesive tape.
- 6.8 All reels will display:
1. Device Type
 2. Quantity on reel
 3. A CML serial number/bar code.
 4. The date reel sealed.
 5. A static hazard warning label
- 6.9 Reels are packed in an anti-static bubble bag or a moisture barrier bag inside a cardboard box with appropriate labelling (Ref Pi-34).

- 6.10 Ideal storage conditions for sealed tape are 15°C to 20°C with a relative humidity less than 60%.
- 6.11 Shelf life of sealed tape when stored in ideal conditions will be in excess of six months.

DRAWINGS:

Package Types: D1 - D6, E1 - E4, L1 - L4, L7 - L9, QT1, Q1 - QT8, QF, QH, T1, B1, A4, A7

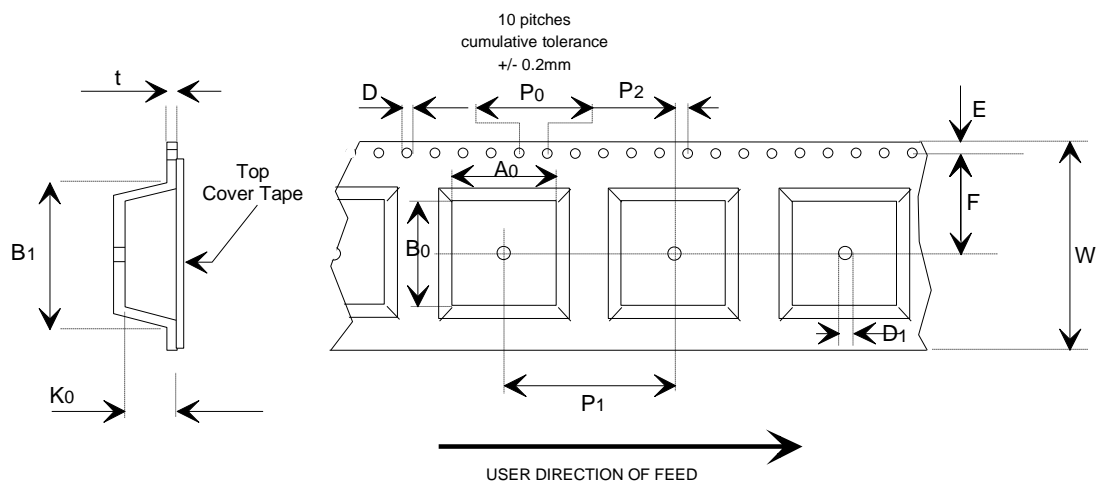


Figure 1a

Package Type: L6

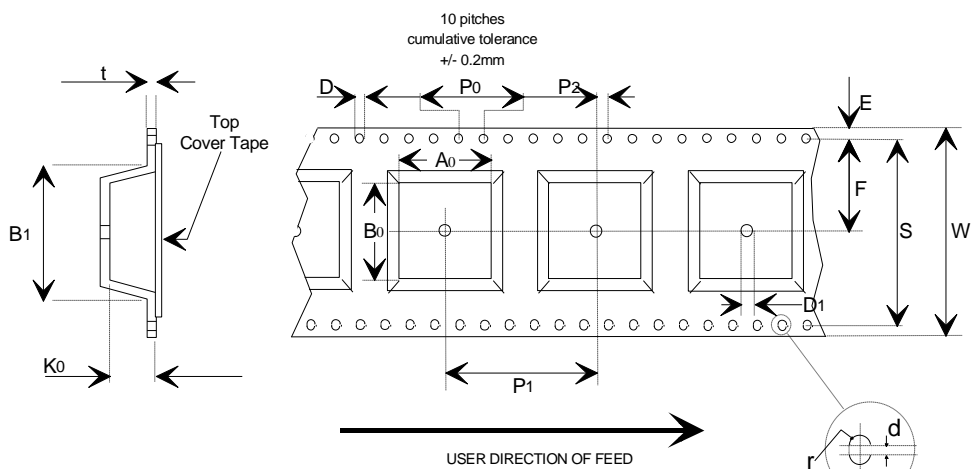
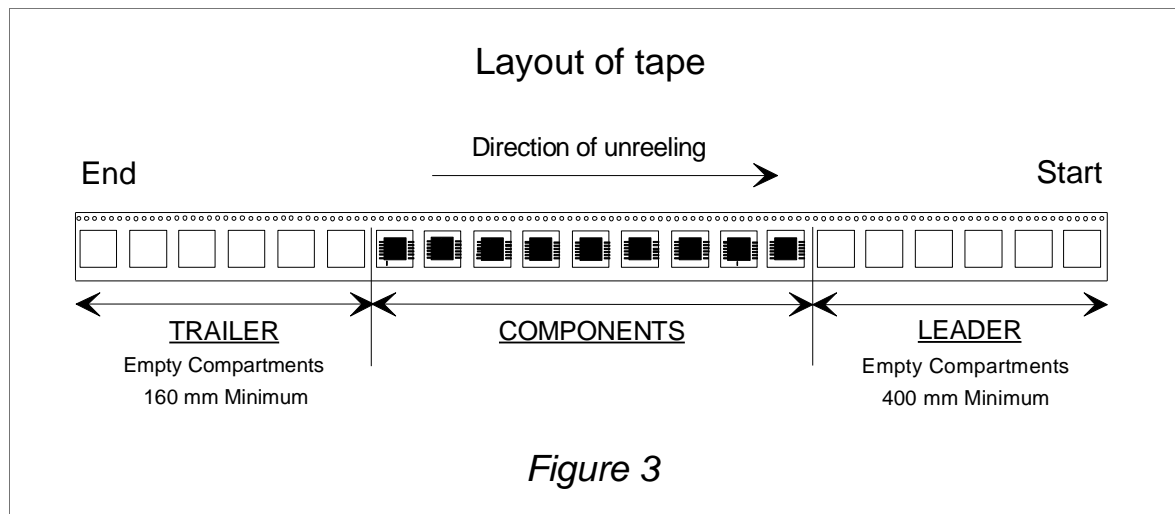
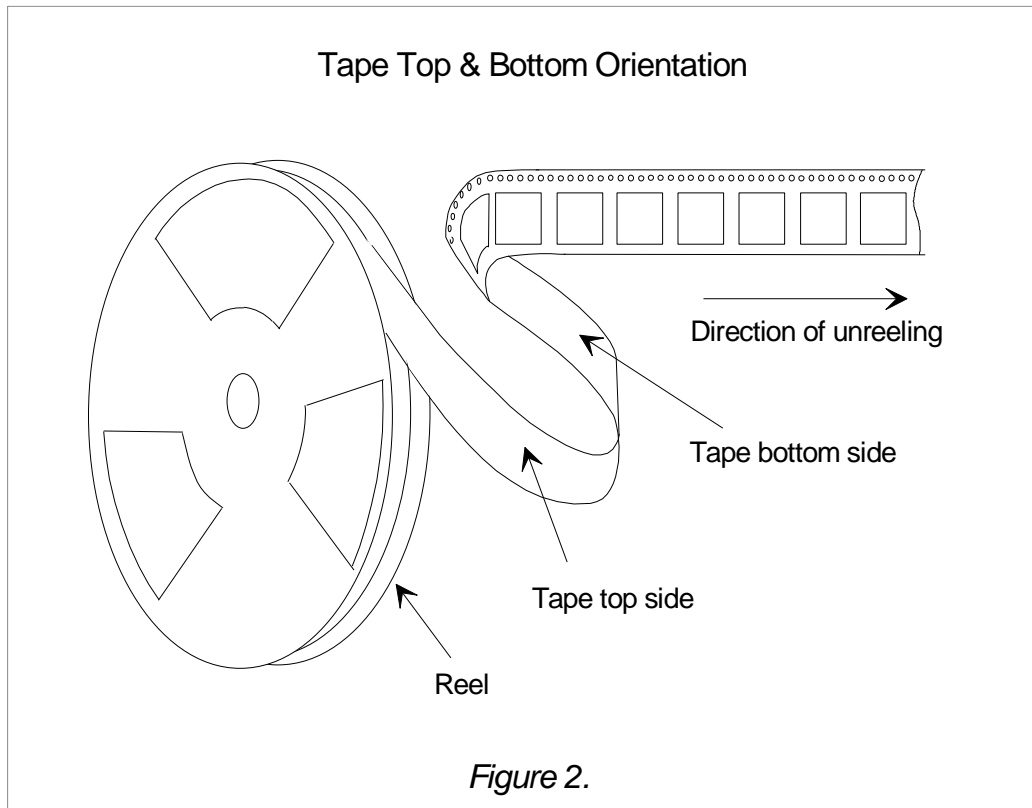


Figure 1b



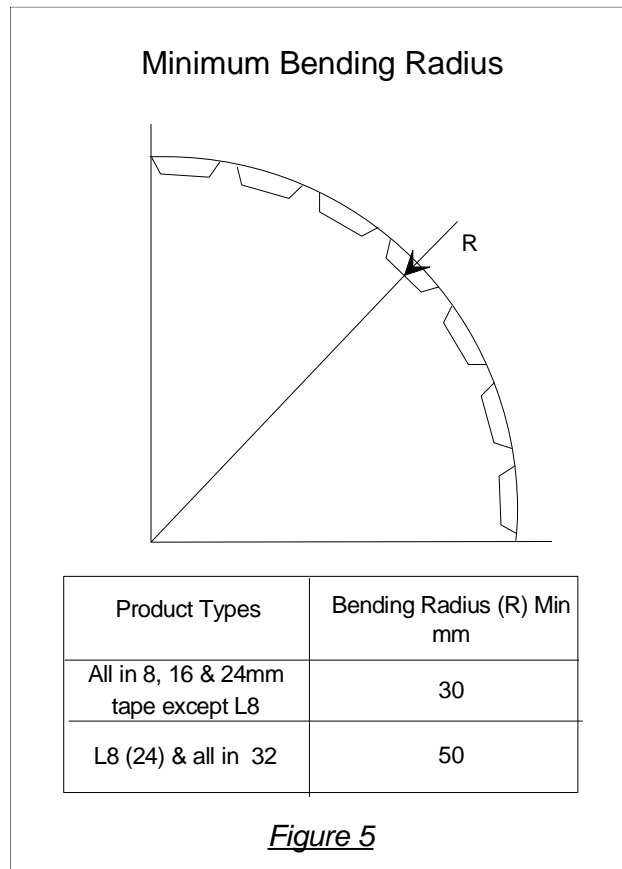
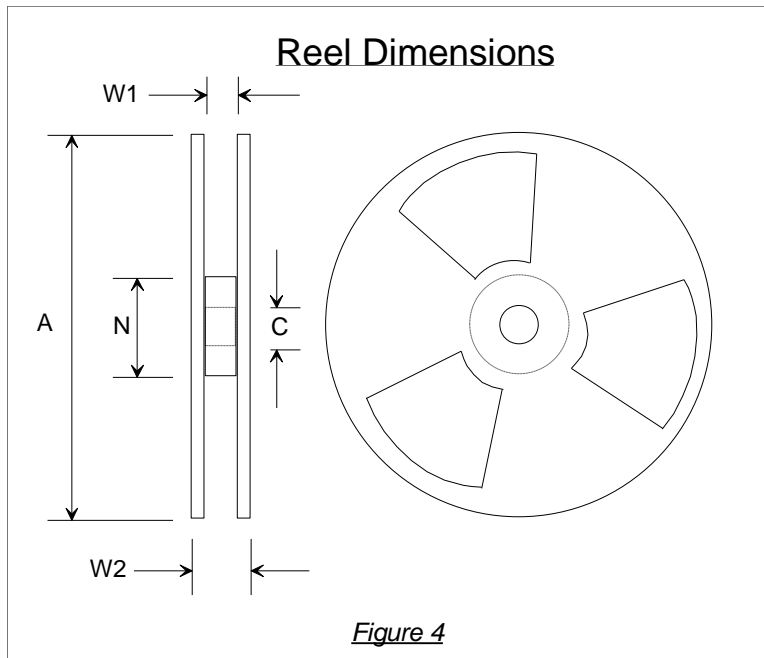


Figure 6a.

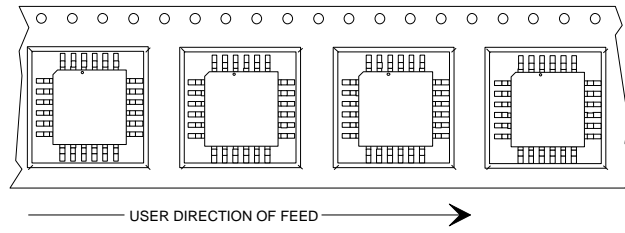


Figure 6b

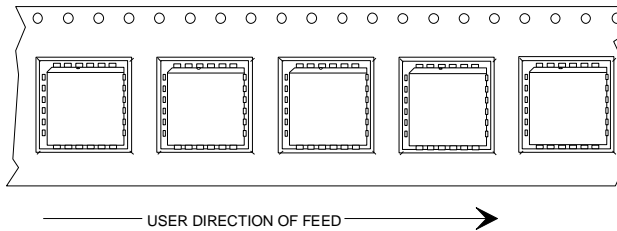


Figure 6c

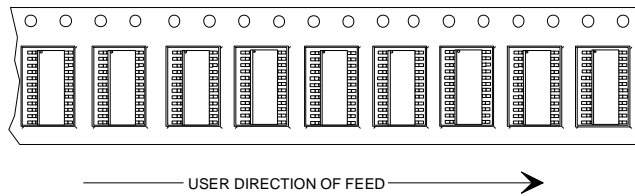


Figure 6d.

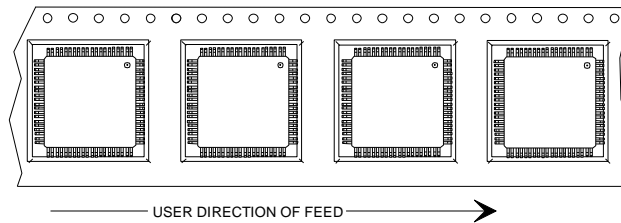


Figure 6e.

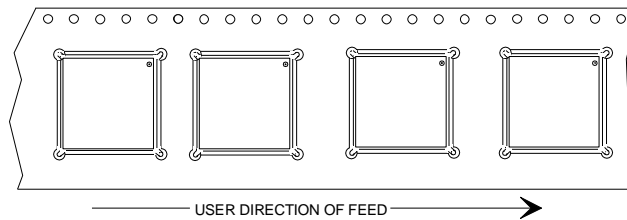


Figure 6f.

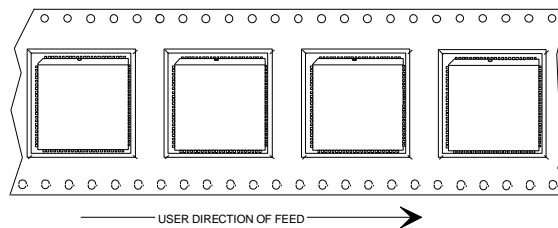


Figure 6. Component Orientation

History

Version	Changes	Date
1	Initial release	March 2002
2	S1 package deleted Drawing 1a removed & 6d modified to remove second row of index holes L8 package included Specification style and layout changed	April 2004
3	Section 5.7: Pull strength speed changed from 240 mm to 300 mm per minute	September 2005
4	Q1-Q5 (incl) data added. Figure 6 updated to include QFN (6e) Pressure sensitive cover tape removed	November 2006
5	L6 package data included. Fig 6 updated to include 44 Lead PLCC (6f)	May 2007
6	Change of Process Owner Q6 and Q7 packages included	July 2014
7	Q8 and QT8 packages added. L3 and M1 packages removed. Change of Managing Director. 5.7:- Peel strength was 60 ± 40 grams, now 60 +40/-30 grams. Table 6.1.1:- Tape width was quoted as 8mm in error, should have been 12mm. This affected values for W, W1 and W2 6.7:- "paper" deleted as it's not always a paper tape used	June 2017
8	QT1, QF and T1 packages added.	March 2021
9	Reviewed tolerances on dimensions. A4, A7, B1 and QH packages added. Added A4, A7, E1, E2, E3, E4, Q1, QT1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, QT8, QF, QH packages in 1Ku quantities on 7" reels	March 2022

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