

## Tape and Reel Packaging for Surface Mount Components

Rev. V17

### 1.0 Introduction

MACOM supplies integrated circuits, diodes, and related surface mount components in tape wound on standard 7-inch and 13-inch diameter reels. This application note documents the reel and tape dimensions and the orientation of the components within the tape cavities for many of our most popular package styles.

#### Packages Covered in This Application Note:

Package Type	Package Type	Package Type
1 mm X1DFN-6LD	ODS-120 (ceramic)	SM-28
1.2 x 1.5 mm TDFN-6LD (0.5 mm pitch)	ODS-186 (ceramic)	SM-41
1.5 x 1.2 mm TDFN-6LD (0.4 mm pitch)	ODS-1056 (ceramic)	SM-44
2 mm PDFN-8LD	ODS-1072 (MELF)	SM-46
2 mm STDFN-8LD	ODS-1079 (MELF)	SM-52
2 mm STQFN-12LD	ODS-1091 (MELF)	SM-55
2 x 2.5 mm STQFN-14LD	ODS-1269 (GaAs flip-chip)	SM-68 (same as SM-44)
3 mm PQFN-12LD	ODS-1294 (surmount)	SM-69 (same as SM-1)
3 mm PQFN-16LD	ODS-1295 (surmount)	SM-74 (same as SM-2)
4 mm PQFN-16LD	ODS-1305 (GaAs flip-chip)	SM-87 (same as SM-1)
4 mm PQFN-20LD	ODS-1306 (surmount)	SM-89 (same as SM-1)
4 mm PQFN-24LD	ODS-1402 (GaAs flip-chip)	SM-106
4 x 6 mm PQFN-32LD	ODS-1411 (GaAs flip-chip)	SM-108 (same as SM-2)
4 x 7 mm PQFN-36LD	ODS-1500 (GaAs flip-chip)	SM-134 (same as SM-1)
5 mm PQFN-20LD	QSOP-16, QSOP-16EP	SOD-323
5 mm PQFN-28LD	QSOP-24	SOIC-8
5 mm PQFN-32LD	QSOP-28	SOIC-14
5 x 6 mm PQFN-32LD	R-1, R-4, R-5, R-15	SOIC-16
6 x 7 mm PQFN-37LD	SC70-3LD	SOIC-16 Wide Body
7 mm LGA-16	SC70-6LD	SOIC-24 Wide Body
8 mm BGA	SC-79	SOT-23
15 mm BGA	SM-1	SOT-25 (same as SOT-23 (5LD))
BD-1, BD-2, BD-3 (Bumped Die)	SM-2	SOT-26 (same as SOT-23 (6LD))
CR-5	SM-3	SOT-89
LCC1	SM-4 (same as SM-2)	SOT-143
LSM1	SM-7-1	SOW-16 (same as SOIC-16 Wide Body)
LSM2	SM-20	SOW-24 (same as SOIC-24 Wide Body)
LSM3	SM-22	SSOP-8
LSM6	SM-23 (same as SM-1)	SSOP-20
MSOP-8, MSOP-8EP	SM-24	SSOP-24
MSOP-10	SM-26	SSOP-28
		TSSOP-16, TSSOP-16EP

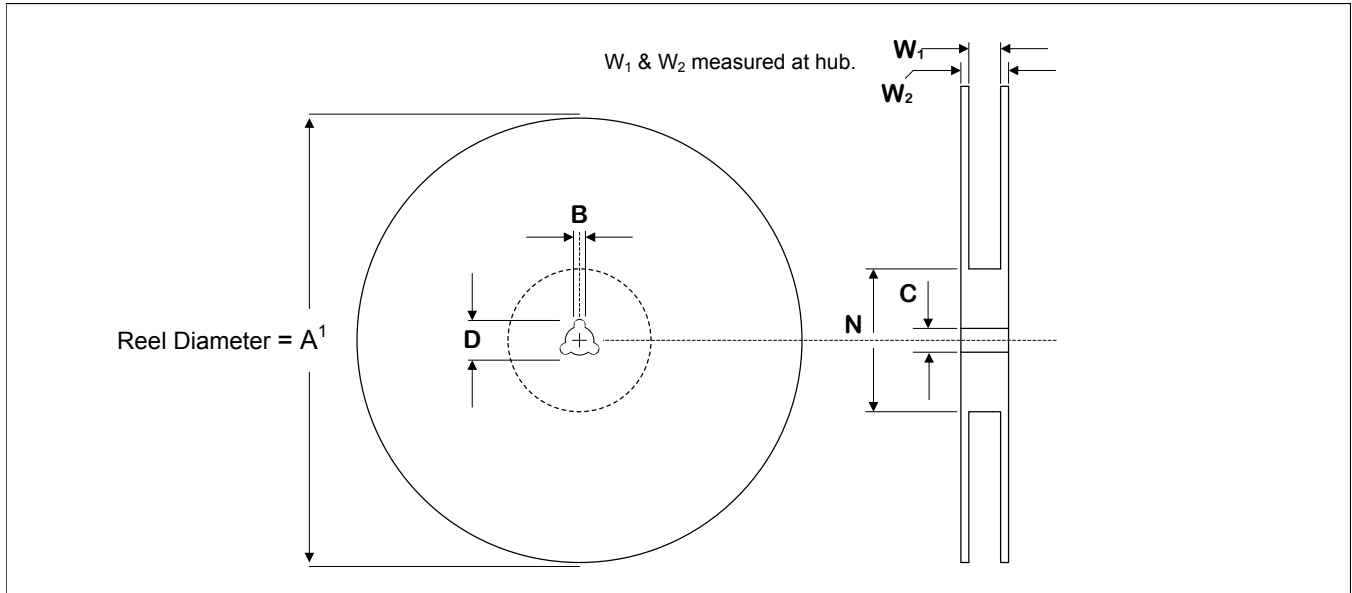
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2.0 Reel Dimensions



Reel Dimensions in mm

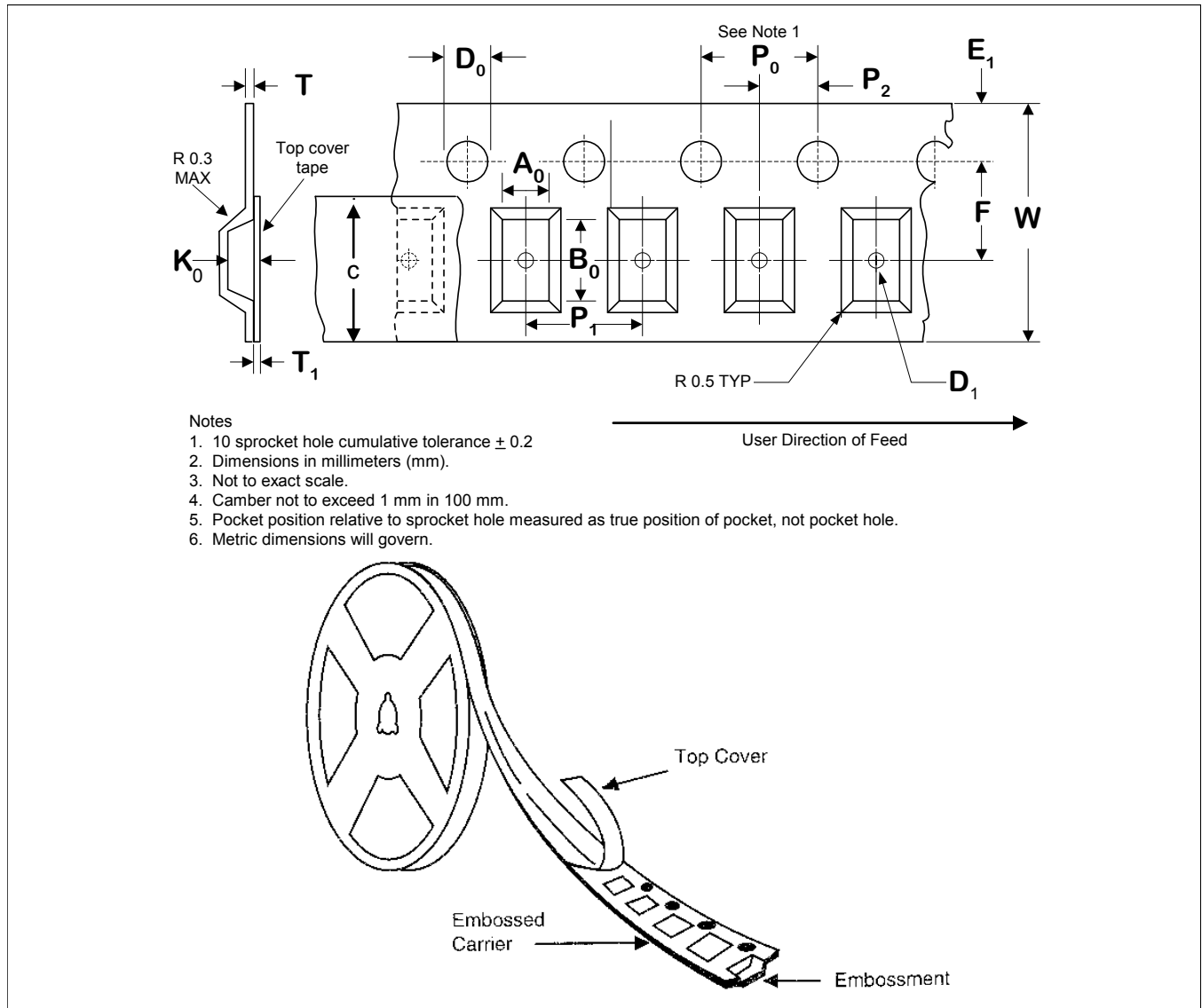
W Tape Width <sup>2</sup>	W <sub>1</sub> (+2.0/-0.0)	W <sub>2</sub> (max.)	N (min.)		B (min.)	C (+0.5/-0.2)	D (min.)
			A = 7 inch	A = 13 inch			
8	8.4	14.4	50	N/A	1.5	13	20.2
12	12.4	18.4	50	100	1.5	13	20.2
16	16.4	22.4	50	100	1.5	13	20.2
24	24.4	30.4	N/A	100	1.5	13	20.2
32	32.4	38.4	N/A	100	1.5	13	20.2

1. See section 5.0 Reel Diameter Dimensions.
2. See section 3.0 Tape Dimensions.

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3.0 Tape Dimensions



Reel Dimensions

Tape Dimensions	Description	Symbol	Size (mm)
Perforation	Diameter	$D_0$	$1.5 +0.1 / -0.0$
	Pitch	$P_0$	$4 \pm 0.1$
	Position	$E_1$	$1.75 \pm 0.1$
	Thickness	$T$	$0.25 \pm 0.1$
Cover Tape	Thickness	$T_1$	$0.06 \pm 0.02$

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### 1 mm X1DFN-6LD

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	1.2 + 0.0/-0.05
	Width	B <sub>0</sub>	1.2 + 0.0/-0.05
	Depth	K <sub>0</sub>	0.55 ± 0.05
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.1
Cover Tape	Width	C	5.5 ± 0.1
Carrier Tape	Width	W	8 ± 0.3

### 1.2 x 1.5 mm TDFN-6LD (0.5 mm Lead Pitch) & 1.5 x 1.2 mm TDFN-6LD (0.4 mm Lead Pitch)

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	1.75 ± 0.1
	Width	B <sub>0</sub>	1.35 ± 0.1
	Depth	K <sub>0</sub>	1.02 ± 0.1
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8 +0.3/-0.1

### 2 mm PDFN-8LD

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	2.42 ± 0.1
	Width	B <sub>0</sub>	2.42 ± 0.1
	Depth	K <sub>0</sub>	1.1 ± 0.1
	Pitch	P <sub>1</sub>	4 ± 0.1
	Diameter	D <sub>1</sub>	1 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	5.5 ± 0.1
Cover Tape	Width	C	9.2 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

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### 2 mm STDFN-8LD, 2 mm STQFN-12LD

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	2.3 ± 0.1
	Width	B <sub>0</sub>	2.3 ± 0.1
	Depth	K <sub>0</sub>	0.75 ± 0.1
	Pitch	P <sub>1</sub>	4 ± 0.1
	Diameter	D <sub>1</sub>	1 ± 0.25
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
Cover Tape	Width	C	5.5 ± 0.1
Carrier Tape	Width	W	8 ± 0.3

### 2 x 2.5 mm STQFN-14LD

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	2.2 ± 0.1
	Width	B <sub>0</sub>	2.7 ± 0.1
	Depth	K <sub>0</sub>	0.7 ± 0.05
	Pitch	P <sub>1</sub>	4 ± 0.1
	Diameter	D <sub>1</sub>	0.7 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.1
Cover Tape	Width	C	5.5 ± 0.1
Carrier Tape	Width	W	8 ± 0.3

### 3 mm PQFN-12LD, 3 mm PQFN-16LD

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	3.3 ± 0.1
	Width	B <sub>0</sub>	3.3 ± 0.1
	Depth	K <sub>0</sub>	1.1 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	5.5 ± 0.1
Cover Tape	Width	C	9.2 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

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**4 mm PQFN-16LD, 4 mm PQFN-20LD, 4 mm PQFN-24LD**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	4.35 ± 0.1
	Width	B <sub>0</sub>	4.35 ± 0.1
	Depth	K <sub>0</sub>	1.1 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	5.5 ± 0.1
Cover Tape	Width	C	9.2 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

**4 x 6 mm PQFN-32LD**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	4.2 ± 0.1
	Width	B <sub>0</sub>	6.2 ± 0.1
	Depth	K <sub>0</sub>	1.2 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

**4 x 7 mm PQFN-36LD**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	4.2 ± 0.1
	Width	B <sub>0</sub>	7.2 ± 0.1
	Depth	K <sub>0</sub>	1.2 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

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### 5 mm PQFN-20LD, 5 mm PQFN-28LD, 5 mm PQFN-32LD

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	5.25 ± 0.1
	Width	B <sub>0</sub>	5.25 ± 0.1
	Depth	K <sub>0</sub>	1.1 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	5.5 ± 0.1
Cover Tape	Width	C	9.2 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

### 5 x 6 PQFN-32LD

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	5.3 ± 0.1
	Width	B <sub>0</sub>	6.3 ± 0.1
	Depth	K <sub>0</sub>	1.2 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

### 6 x 7 PQFN-37LD

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	6.4 ± 0.1
	Width	B <sub>0</sub>	7.4 ± 0.1
	Depth	K <sub>0</sub>	1.2 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

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### 7 mm LGA-16LD

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	7.4 ± 0.1
	Width	B <sub>0</sub>	7.4 ± 0.1
	Depth	K <sub>0</sub>	1.9 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

### 8 mm BGA

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	8.3 ± 0.1
	Width	B <sub>0</sub>	8.3 ± 0.1
	Depth	K <sub>0</sub>	2.7 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

### 15 mm BGA

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	15.3 ± 0.1
	Width	B <sub>0</sub>	15.3 ± 0.1
	Depth	K <sub>0</sub>	3.8 ± 0.1
	Pitch	P <sub>1</sub>	20 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	11.5 ± 0.1
Cover Tape	Width	C	21 ± 0.1
Carrier Tape	Width	W	24 ± 0.3



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**BD-1**

Tape Dimensions	Description	Symbol	Size (mm)
<b>Cavity</b>	Length	A <sub>0</sub>	0.82 ± 0.05
	Width	B <sub>0</sub>	0.82 ± 0.05
	Depth	K <sub>0</sub>	0.395 ± 0.05
	Pitch	P <sub>1</sub>	4 ± 0.1
	Pocket Hole Diameter	D <sub>1</sub>	0.35 ± 0.05
<b>Distance Between Centerlines</b>	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
<b>Cover Tape</b>	Width	C	5.3 ± 0.1
<b>Carrier Tape</b>	Width	W	8 ± 0.1

**BD-2**

Tape Dimensions	Description	Symbol	Size (mm)
<b>Cavity</b>	Length	A <sub>0</sub>	1.1 ± 0.05
	Width	B <sub>0</sub>	1.25 ± 0.05
	Depth	K <sub>0</sub>	0.298 ± 0.028
	Pitch	P <sub>1</sub>	4 ± 0.1
	Pocket Hole Diameter	D <sub>1</sub>	0.5 ± 0.05
<b>Distance Between Centerlines</b>	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
<b>Cover Tape</b>	Width	C	5.3 ± 0.1
<b>Carrier Tape</b>	Width	W	8 +0.3/-0.1

**BD-3**

Tape Dimensions	Description	Symbol	Size (mm)
<b>Cavity</b>	Length	A <sub>0</sub>	0.58 ± 0.05
	Width	B <sub>0</sub>	0.7 ± 0.05
	Depth	K <sub>0</sub>	0.36 ± 0.05
	Pitch	P <sub>1</sub>	4 ± 0.1
	Pocket Hole Diameter	D <sub>1</sub>	N/A
<b>Distance Between Centerlines</b>	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
<b>Cover Tape</b>	Width	C	5.3 ± 0.1
<b>Carrier Tape</b>	Width	W	8 ± 0.1

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**CR-5**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	9.02 ± 0.1
	Width	B <sub>0</sub>	9.91 ± 0.1
	Depth	K <sub>0</sub>	2.03 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	11.5 ± 0.1
Cover Tape	Width	C	21 ± 0.1
Carrier Tape	Width	W	24 ± 0.3

**LCC1**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	10.47
	Width	B <sub>0</sub>	11.15
	Depth	K <sub>0</sub>	3.38
	Pitch	P <sub>1</sub>	16
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	11.5
Carrier Tape	Width	W	24

**LSM1**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	13
	Width	B <sub>0</sub>	13
	Depth	K <sub>0</sub>	4.7
	Pitch	P <sub>1</sub>	16
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	11.5
Carrier Tape	Width	W	24

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**LSM2**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	10.08
	Width	B <sub>0</sub>	15.29
	Depth	K <sub>0</sub>	3.94
	Pitch	P <sub>1</sub>	16
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	11.5
Carrier Tape	Width	W	24

**LSM3**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	10.97
	Width	B <sub>0</sub>	12.62
	Depth	K <sub>0</sub>	4.75
	Pitch	P <sub>1</sub>	16
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	11.5
Carrier Tape	Width	W	24

**LSM6**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	20.5
	Width	B <sub>0</sub>	15
	Depth	K <sub>0</sub>	4.1
	Pitch	P <sub>1</sub>	24
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	11.5
Carrier Tape	Width	W	24

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**MSOP-8, MSOP-8EP, MSOP-10**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	5.3 ± 0.1
	Width	B <sub>0</sub>	3.4 ± 0.1
	Depth	K <sub>0</sub>	1.4 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	5.5 ± 0.1
Cover Tape	Width	C	9.2 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

**ODS-120**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	1.42 - 1.79
	Width	B <sub>0</sub>	1.29 - 1.52
	Depth	K <sub>0</sub>	1.42 - 1.78
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8 +0.3/-0.1

**ODS-186**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	9.32 ± 0.1
	Width	B <sub>0</sub>	2.7 ± 0.1
	Depth	K <sub>0</sub>	1.37 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.1

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ODS-1056

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	2 ± 0.1
	Width	B <sub>0</sub>	2 ± 0.1
	Depth	K <sub>0</sub>	1.19 ± 0.1
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8 +0.3/-0.1

ODS-1072

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	2.54 ± 0.1
	Width	B <sub>0</sub>	3.56 ± 0.1
	Depth	K <sub>0</sub>	2.54 ± 0.1
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	5.5 ± 0.05
Cover Tape	Width	C	9.3 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

ODS-1079

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	3.2 ± 0.1
	Width	B <sub>0</sub>	5.46 ± 0.1
	Depth	K <sub>0</sub>	2.54 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	5.5 ± 0.05
Cover Tape	Width	C	9.3 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

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ODS-1091

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	4.19 ± 0.1
	Width	B <sub>0</sub>	5.38 ± 0.1
	Depth	K <sub>0</sub>	4.06 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	5.5 ± 0.05
Cover Tape	Width	C	9.3 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

ODS-1294,1295,1306

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	0.64 ± 0.05
	Width	B <sub>0</sub>	1.12 ± 0.05
	Depth	K <sub>0</sub>	0.3 ± 0.05
	Pitch	P <sub>1</sub>	4.0 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2.0 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8.0 +0.30/-0.1

ODS-1305,1269

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	0.47 ± 0.03
	Width	B <sub>0</sub>	0.84 ± 0.03
	Depth	K <sub>0</sub>	0.31 ± 0.03
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8 +0.3/-0.1

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### ODS-1402,1411,1500

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	0.46 ± 0.03
	Width	B <sub>0</sub>	0.79 ± 0.03
	Depth	K <sub>0</sub>	0.28 ± 0.03
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8 +0.3/-0.1

### QSOP-16, QSOP-16EP

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	6.8 ± 0.1
	Width	B <sub>0</sub>	5.4 ± 0.1
	Depth	K <sub>0</sub>	1.6 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

### QSOP-24

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	6.5 ± 0.1
	Width	B <sub>0</sub>	9 ± 0.1
	Depth	K <sub>0</sub>	2.1 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

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QSOP-28

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	6.5 ± 0.1
	Width	B <sub>0</sub>	10.3 ± 0.1
	Depth	K <sub>0</sub>	2.1 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

R-1, R-4, R-5, R-15

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	12.5 ± 0.1
	Width	B <sub>0</sub>	12.9 ± 0.1
	Depth	K <sub>0</sub>	6.1 ± 0.1
	Pitch	P <sub>1</sub>	16 ± 0.1
Carrier Tape	Width	W	24 ± 0.3

SC70-3LD, SC70-6LD

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	2.25 ± 0.1
	Width	B <sub>0</sub>	2.4 ± 0.1
	Depth	K <sub>0</sub>	1.2 ± 0.1
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	3.5 ± 0.1
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8 ± 0.3



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SC-79

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	0.9 ± 0.05
	Width	B <sub>0</sub>	1.94 ± 0.05
	Depth	K <sub>0</sub>	0.73 ± 0.05
	Pitch	P <sub>1</sub>	4 ± 0.05
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8 +0.3/-0.1

SM-1, SM-23, SM-69, SM-87, SM-89, SM-134

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	7 ± 0.1
	Width	B <sub>0</sub>	8.5 ± 0.1
	Depth	K <sub>0</sub>	5.3 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

SM-2, SM-4, SM-74, SM-108

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	10.26 ± 0.1
	Width	B <sub>0</sub>	13.46 ± 0.1
	Depth	K <sub>0</sub>	6.1 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Carrier Tape	Width	W	24 ± 0.3

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**SM-3**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	20.5 ± 0.1
	Width	B <sub>0</sub>	20.5 ± 0.1
	Depth	K <sub>0</sub>	5.3 ± 0.1
	Pitch	P <sub>1</sub>	24 ± 0.1
Carrier Tape	Width	W	32 ± 0.3

**SM-7-1**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	16.3 ± 0.1
	Width	B <sub>0</sub>	21.4 ± 0.1
	Depth	K <sub>0</sub>	5.6 ± 0.1
	Pitch	P <sub>1</sub>	24 ± 0.1
Carrier Tape	Width	W	32 ± 0.3

**SM-20**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	8.1 ± 0.1
	Width	B <sub>0</sub>	15.4 ± 0.1
	Depth	K <sub>0</sub>	7.1 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Carrier Tape	Width	W	24 ± 0.3

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**SM-22**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	4.3 ± 0.1
	Width	B <sub>0</sub>	5 ± 0.1
	Depth	K <sub>0</sub>	2.8 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

**SM-24**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	10.5 ± 0.1
	Width	B <sub>0</sub>	8.28 ± 0.1
	Depth	K <sub>0</sub>	5.5 ± 0.1
	Pitch	P <sub>1</sub>	16 ± 0.1
Carrier Tape	Width	W	24 ± 0.3

**SM-26**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	12.1 ± 0.1
	Width	B <sub>0</sub>	19.8 ± 0.1
	Depth	K <sub>0</sub>	5.5 ± 0.1
	Pitch	P <sub>1</sub>	16 ± 0.1
Carrier Tape	Width	W	32 ± 0.3

**SM-28**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	12.1 ± 0.1
	Width	B <sub>0</sub>	21.1 ± 0.1
	Depth	K <sub>0</sub>	6.5 ± 0.1
	Pitch	P <sub>1</sub>	24 ± 0.1
Carrier Tape	Width	W	32 ± 0.3

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**SM-41**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	6.9 ± 0.1
	Width	B <sub>0</sub>	8.4 ± 0.1
	Depth	K <sub>0</sub>	7.4 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Carrier Tape	Width	W	24 ± 0.3

**SM-44, SM-68**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	7.5 ± 0.1
	Width	B <sub>0</sub>	8.4 ± 0.1
	Depth	K <sub>0</sub>	5.5 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

**SM-46**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	20.9 ± 0.1
	Width	B <sub>0</sub>	11.4 ± 0.1
	Depth	K <sub>0</sub>	6.8 ± 0.1
	Pitch	P <sub>1</sub>	24 ± 0.1
Carrier Tape	Width	W	32 ± 0.3

**SM-52**

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	5.6 ± 0.1
	Width	B <sub>0</sub>	5.6 ± 0.1
	Depth	K <sub>0</sub>	3 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

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### SM-55

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	6.8 ± 0.1
	Width	B <sub>0</sub>	7.6 ± 0.1
	Depth	K <sub>0</sub>	3.5 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

### SM-106

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	10.7 ± 0.1
	Width	B <sub>0</sub>	20.8 ± 0.1
	Depth	K <sub>0</sub>	6 ± 0.1
	Pitch	P <sub>1</sub>	24 ± 0.1
Carrier Tape	Width	W	32 ± 0.3

### SOD-323

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	1.46 ± 0.1
	Width	B <sub>0</sub>	2.9 ± 0.05
	Depth	K <sub>0</sub>	1.25 ± 0.05
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.05
	Cavity to Perforation (width)	F	3.5 ± 0.05
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8 +0.3/-0.1

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### SOIC-8 (SO-8)

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	6.4 ± 0.1
	Width	B <sub>0</sub>	5.2 ± 0.1
	Depth	K <sub>0</sub>	2.1 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	5.5 ± 0.1
Cover Tape	Width	C	9.2 ± 0.1
Carrier Tape	Width	W	12 ± 0.3

### SOIC-14 (SO-14), SSOP-24

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	6.5 ± 0.1
	Width	B <sub>0</sub>	9 ± 0.1
	Depth	K <sub>0</sub>	2.1 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

### SOIC-16 (SO-16), SSOP-28

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	6.5 ± 0.1
	Width	B <sub>0</sub>	10.3 ± 0.1
	Depth	K <sub>0</sub>	2.1 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

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SOT-23

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	3.125 ± 0.125
	Width	B <sub>0</sub>	2.835 ± 0.165
	Depth	K <sub>0</sub>	1.23 ± 0.11
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	3.5 ± 0.1
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8 ± 0.3

SOT-25, SOT-26

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	3.2 ± 0.1
	Width	B <sub>0</sub>	3.2 ± 0.1
	Depth	K <sub>0</sub>	1.4 ± 0.1
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	3.5 ± 0.1
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8 ± 0.3

SOT-89

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	4.6 ± 0.1
	Width	B <sub>0</sub>	4.78 ± 0.1
	Depth	K <sub>0</sub>	1.9 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	5.5 ± 0.5
Cover Tape	Width	C	9.3 ± 0.1
Carrier Tape	Width	W	12 ± 0.2

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### SOT-143

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	3.1 ± 0.1
	Width	B <sub>0</sub>	2.69 ± 0.1
	Depth	K <sub>0</sub>	1.3 ± 0.1
	Pitch	P <sub>1</sub>	4 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	3.5 ± 0.1
Cover Tape	Width	C	5.4 ± 0.1
Carrier Tape	Width	W	8 ± 0.3

### SOW-16 (SOIC-16 Wide Body)

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	10.9 ± 0.1
	Width	B <sub>0</sub>	10.7 ± 0.1
	Depth	K <sub>0</sub>	3 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

### SOW-24 (SOIC-24 Wide Body)

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	10.7 ± 0.2
	Width	B <sub>0</sub>	15.8 ± 0.2
	Depth	K <sub>0</sub>	3 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	11.5 ± 0.1
Cover Tape	Width	C	20
Carrier Tape	Width	W	24 ± 0.3



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### SSOP-8

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	3.4 ± 0.1
	Width	B <sub>0</sub>	8.3 ± 0.1
	Depth	K <sub>0</sub>	2.54 ± 0.1
	Pitch	P <sub>1</sub>	8
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

### SSOP-20

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	8.2 ± 0.1
	Width	B <sub>0</sub>	7.5 ± 0.1
	Depth	K <sub>0</sub>	2.5 ± 0.1
	Pitch	P <sub>1</sub>	12 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

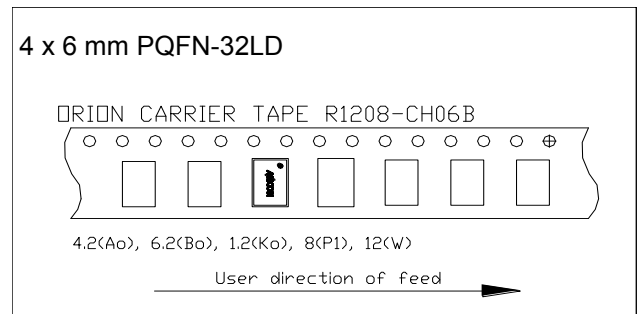
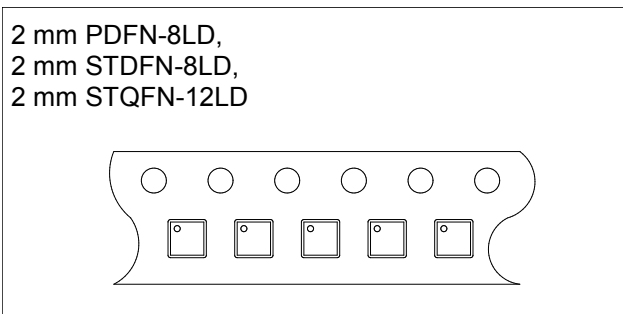
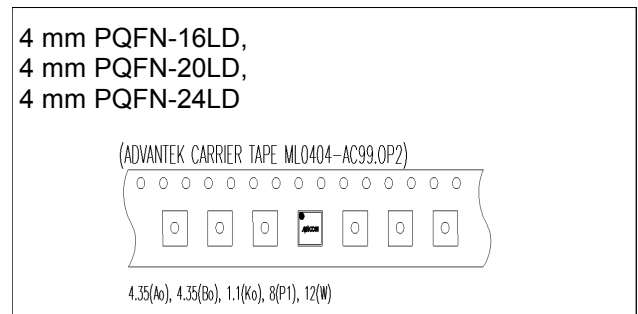
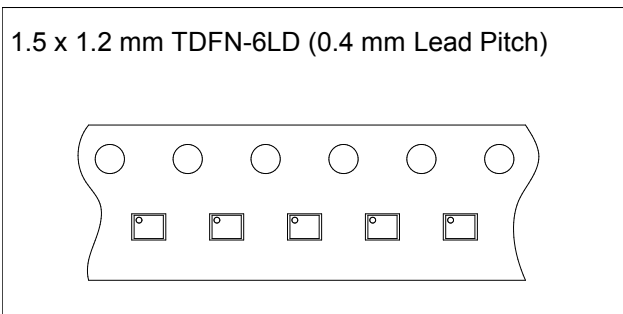
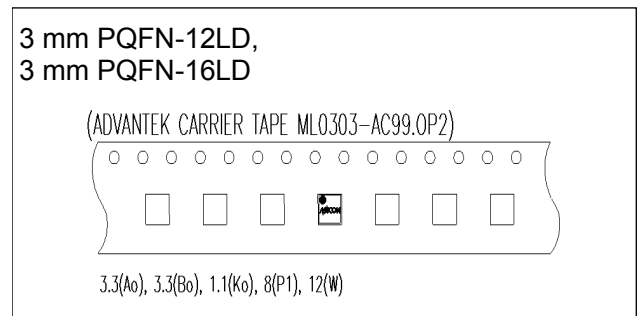
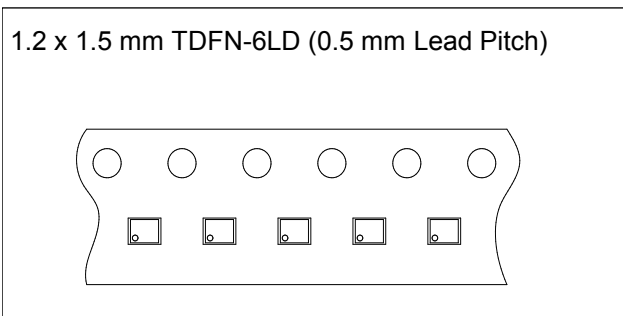
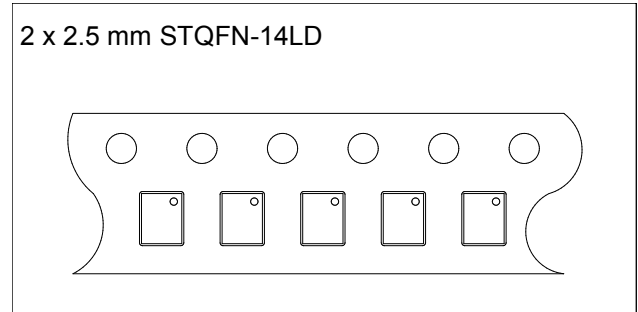
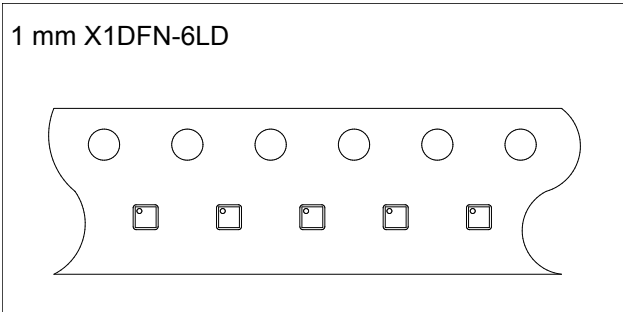
### TSSOP-16, TSSOP-16EP

Tape Dimensions	Description	Symbol	Size (mm)
Cavity	Length	A <sub>0</sub>	6.95 ± 0.1
	Width	B <sub>0</sub>	5.6 ± 0.1
	Depth	K <sub>0</sub>	1.6 ± 0.1
	Pitch	P <sub>1</sub>	8 ± 0.1
Distance Between Centerlines	Cavity to Perforation (length)	P <sub>2</sub>	2 ± 0.1
	Cavity to Perforation (width)	F	7.5 ± 0.1
Cover Tape	Width	C	13.3 ± 0.1
Carrier Tape	Width	W	16 ± 0.3

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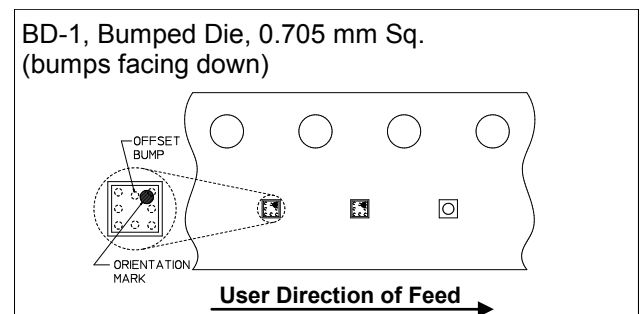
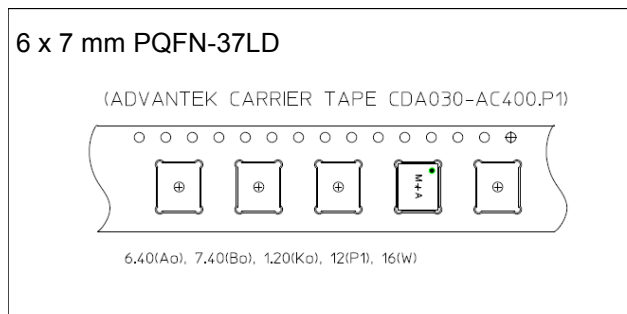
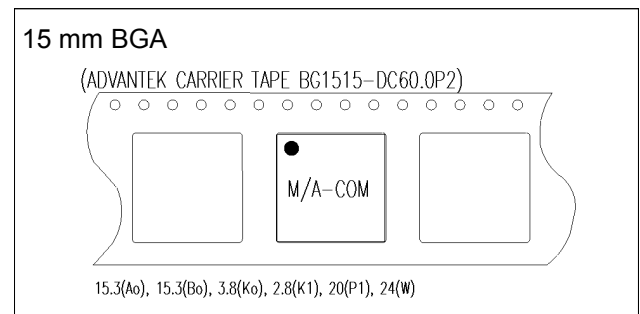
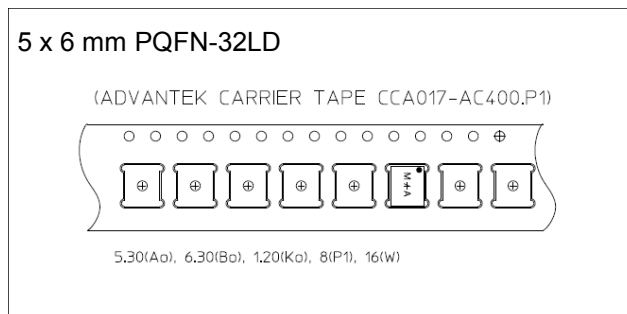
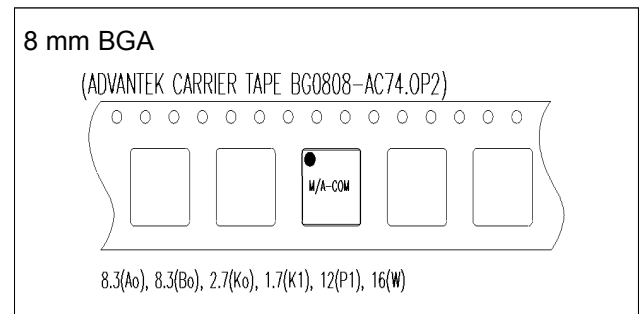
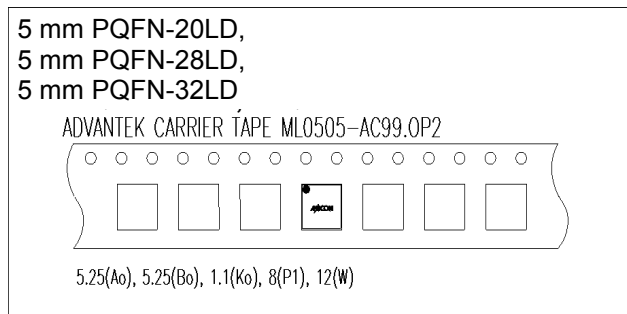
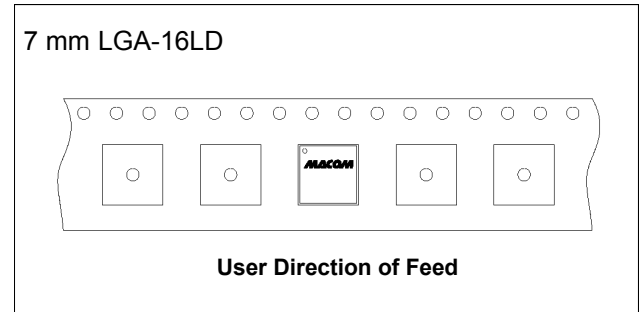
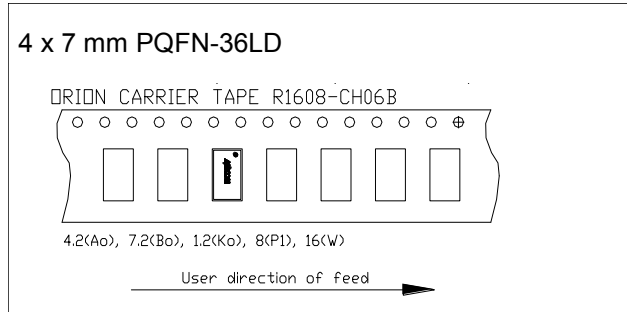
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**4.0 Component Orientation for Tape and Reel**



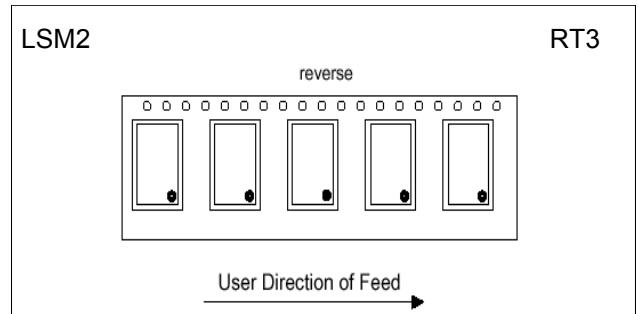
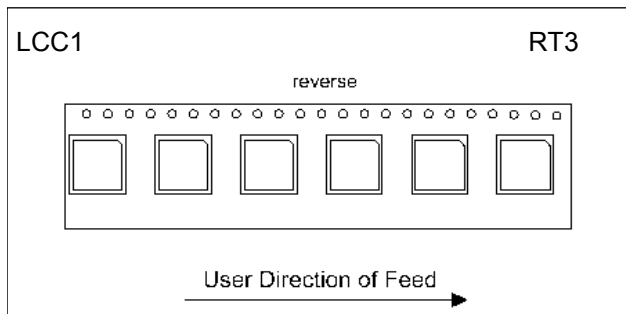
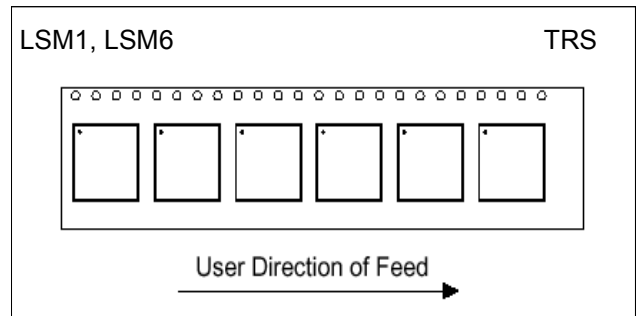
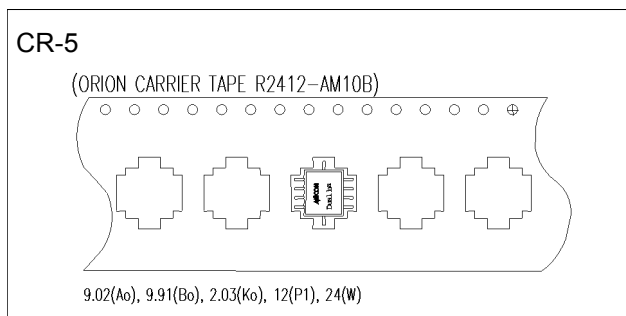
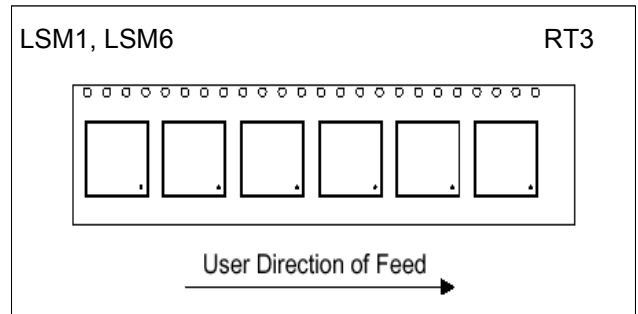
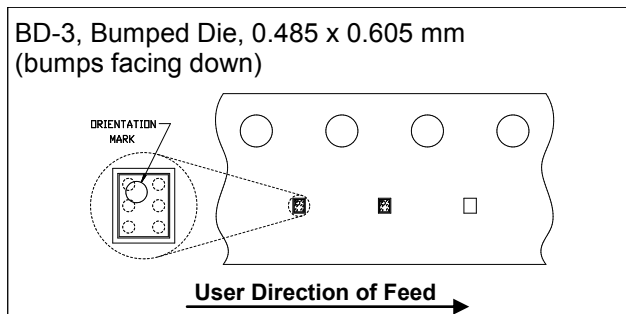
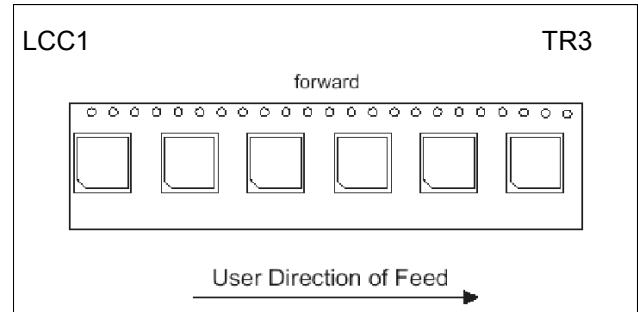
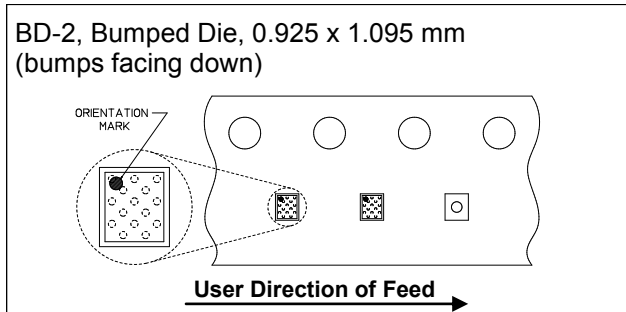
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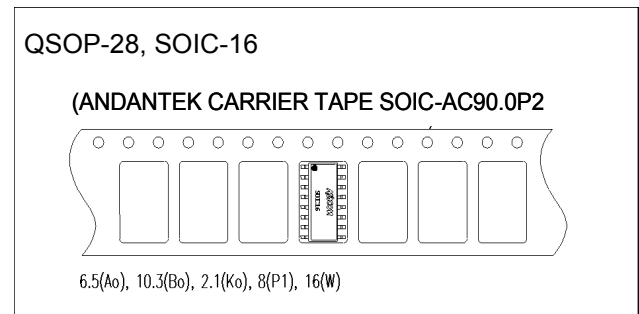
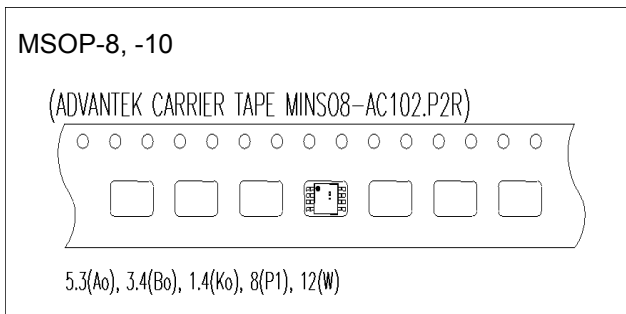
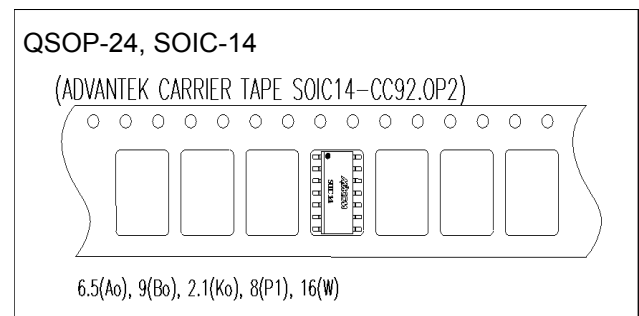
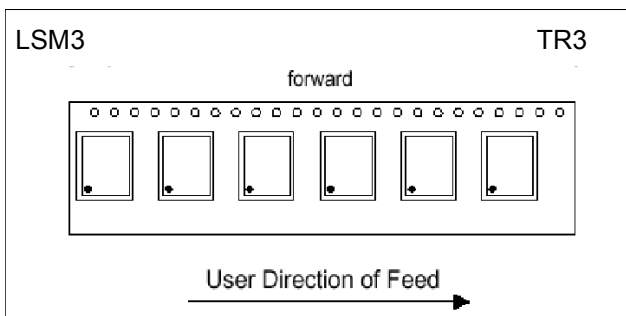
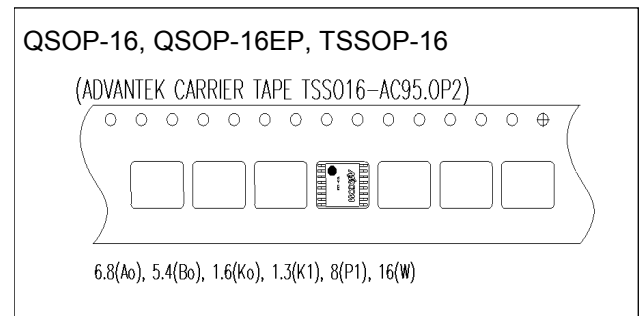
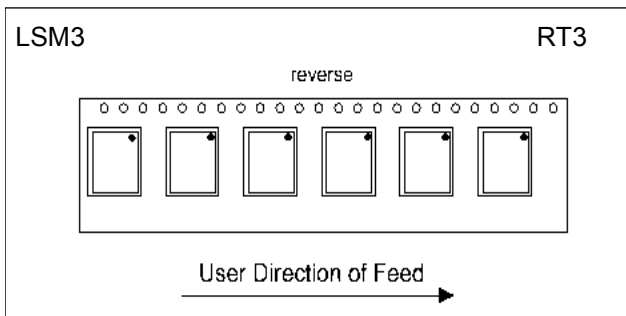
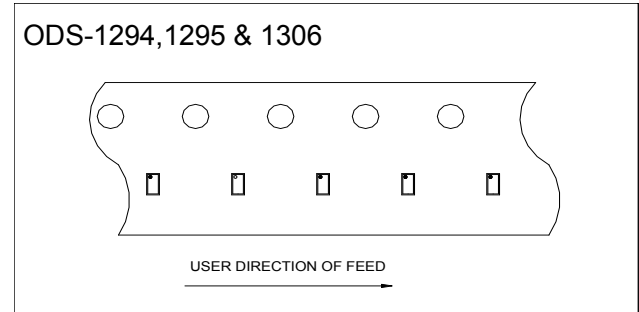
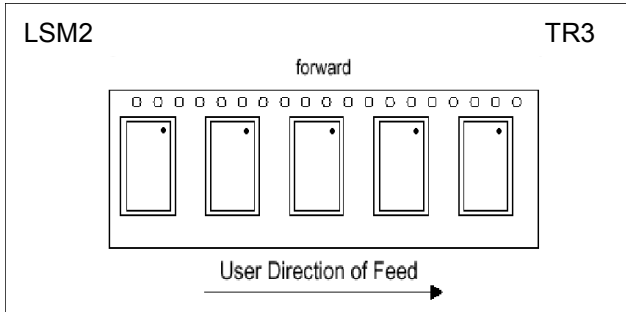
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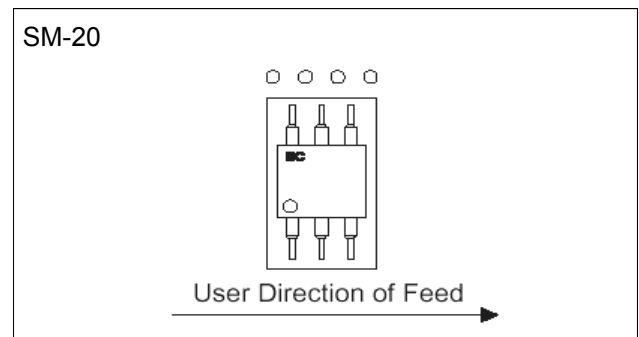
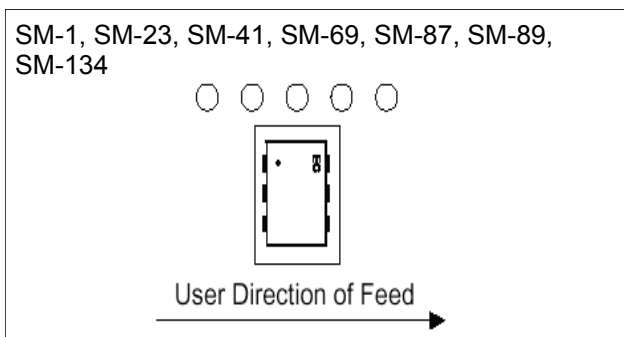
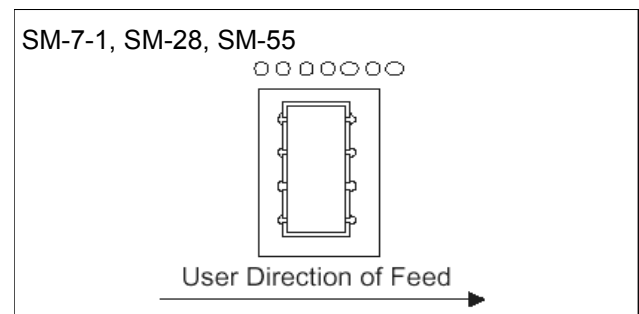
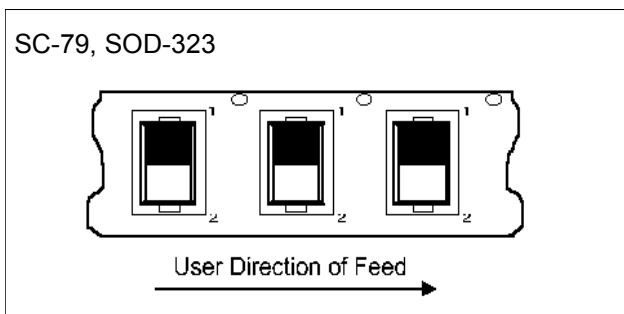
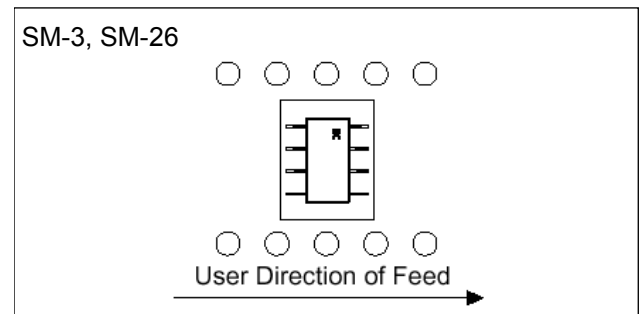
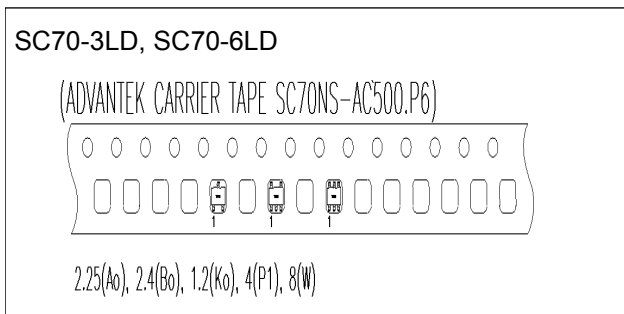
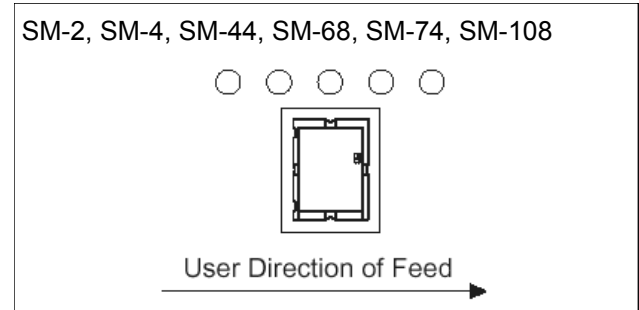
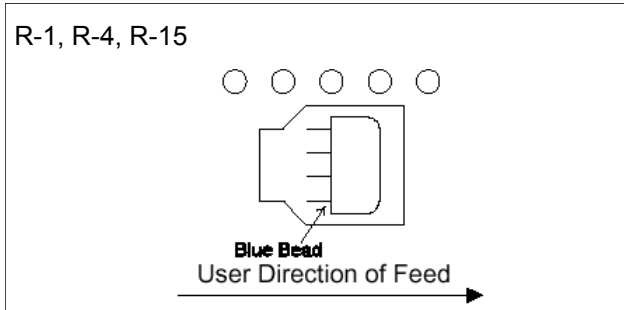
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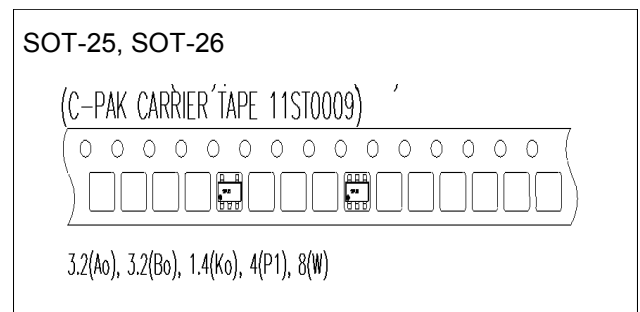
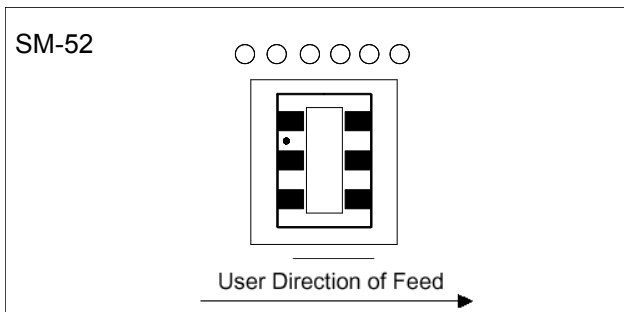
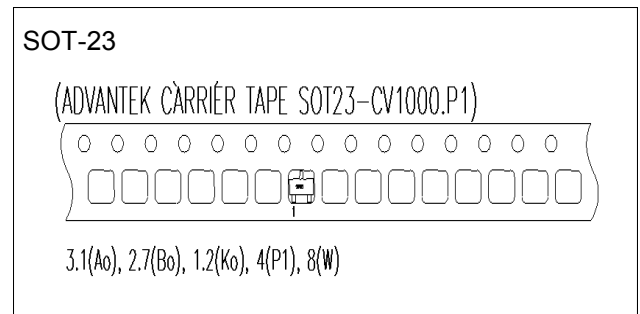
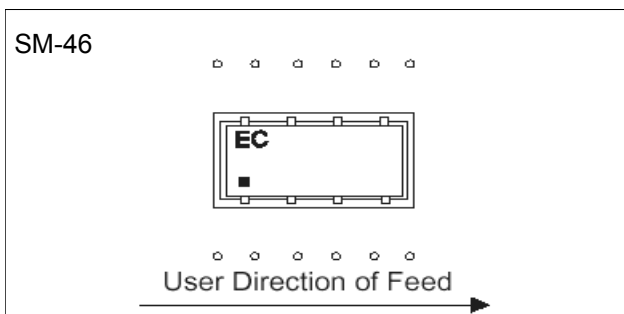
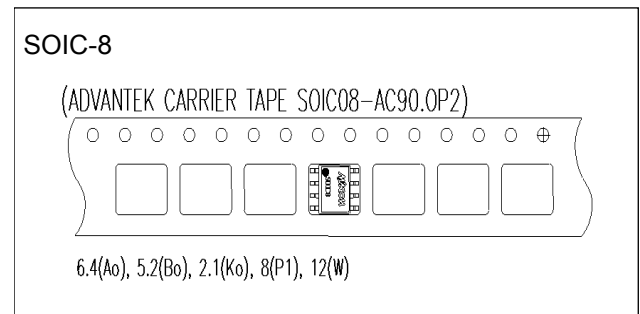
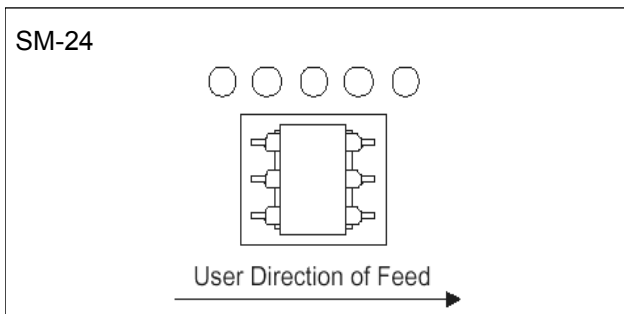
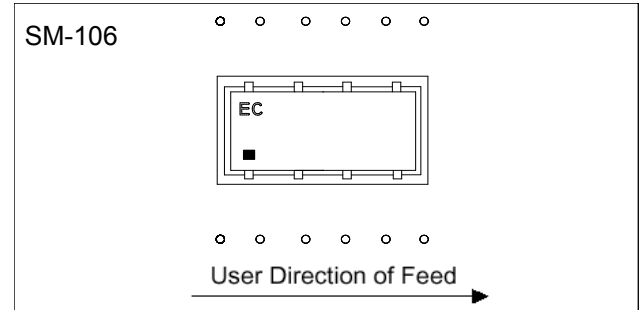
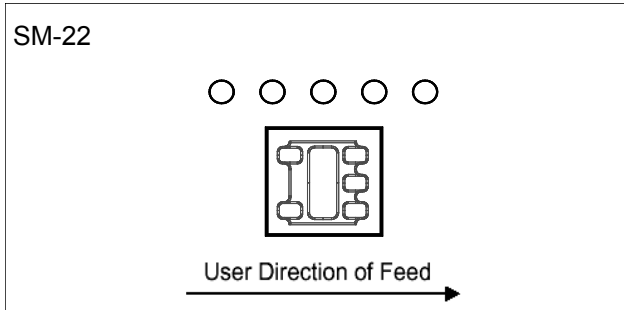
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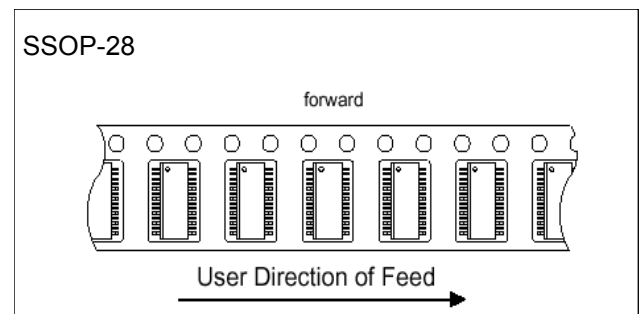
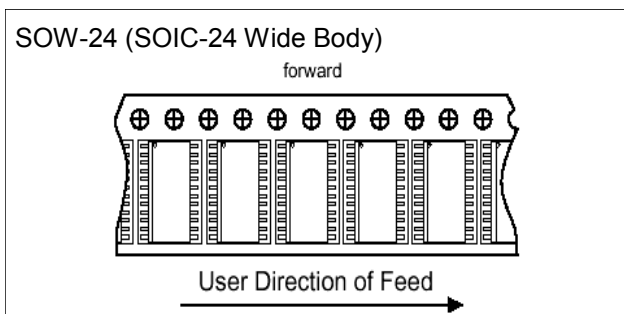
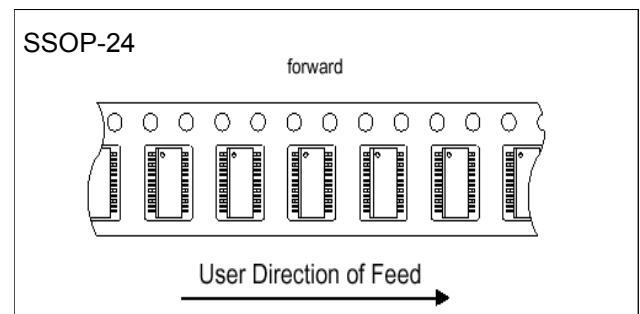
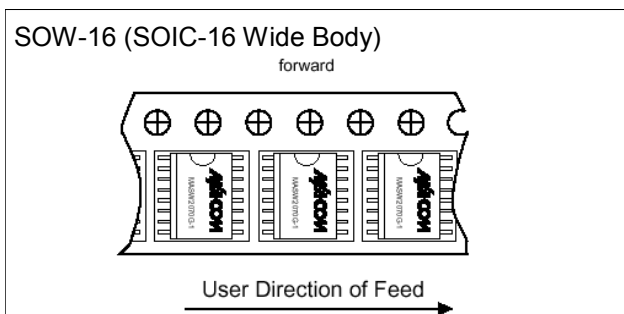
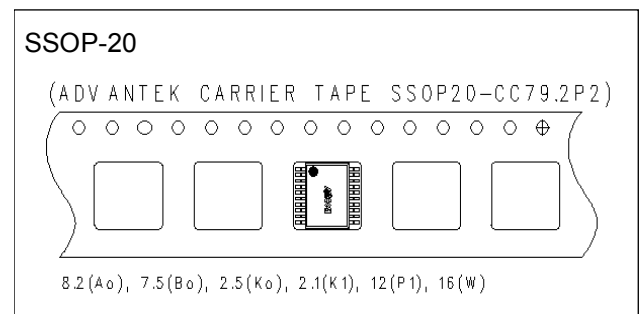
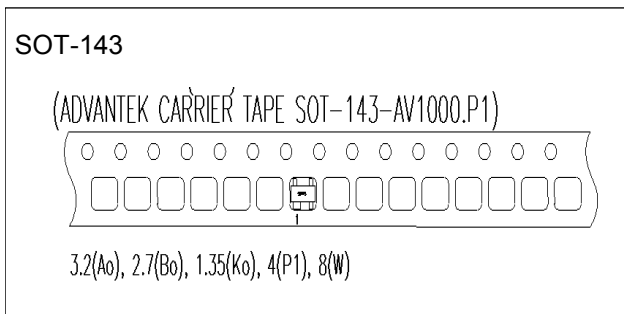
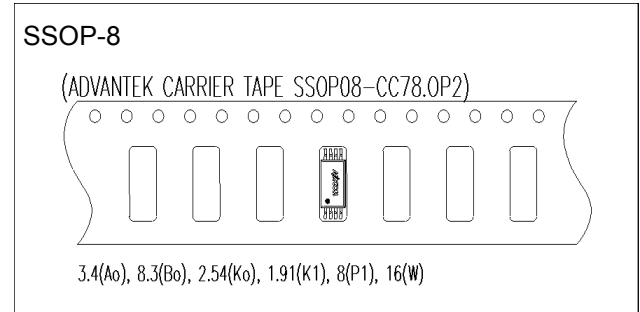
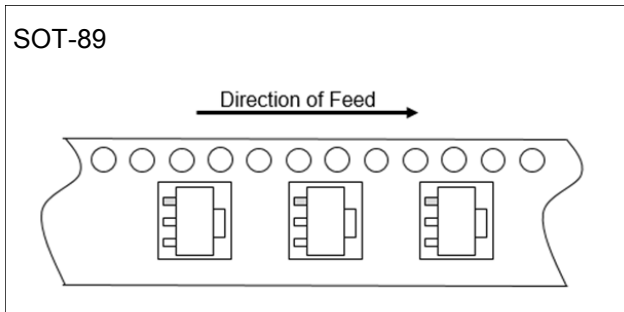
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### 5.0 Reel Information<sup>3,4</sup>

Package Type	Max. Devices per Reel	Reel Diameter (inches)
1 mm X1DFN-6LD, 2 mm STDFN-8LD, 2 mm STQFN-12LD, 2 x 2.5 mm STQFN-14LD	3000	7
1.2 x 1.5 mm TDFN-6LD (0.5 mm pitch), 1.5 x 1.2 mm TDFN-6LD (0.4 mm pitch)	3000	7
2 mm PDFN-8LD	3000	13
3 mm PQFN-12LD, 3 mm PQFN-16LD, 4 mm PQFN-16LD, 4 mm PQFN-20LD, 4 mm PQFN-24LD	1000 3000	7 13
4 x 6 mm PQFN-32LD, 4 x 7 mm PQFN-36LD	1000	7
5 mm PQFN-20LD, 5 mm PQFN-28LD, 5 mm PQFN-32LD	1000	7
5 x 6 mm PQFN-36LD	1000 3000	7 13
6 x 7 mm PQFN-37LD	1000 3000	7 13
7 mm LGA-16LD	500	7
8 mm BGA, 15 mm BGA	1000	13
BD-1, BD-2, BD-3	3000	7
CR-5	2500	13
LCC1, LSM1, LSM2, LSM3	500	13
MSOP8, MSOP-8EP, MSOP-10	1000 3000	7 13
ODS-120	2000	7
ODS-186	750	7
ODS-1056	2500	7
ODS-1072	5000	13
ODS-1079	750	7
ODS-1091	500	7
ODS-1269, 1294, 1295, 1305, 1306, 1402, 1411, 1500	3000	7

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### 5.0 Reel Information (continued)<sup>3,4</sup>

Package Type	Max. Devices per Reel	Reel Diameter (inches)
QSOP-16, QSOP-16EP, QSOP-24, QSOP-28	1000	7
R-1, R-4, R-5, R-15	500	13
SC70-3LD, SC70-6LD, SC-79, SOT-23, SOT-25, SOT-26, SOT-89, SOT-143, SOD-323	3000	7
SM-1, SM-55, SM-69	900	13
SM-2, SM-4, SM-7-1, SM-20, SM-23, SM-24, SM-41, SM-44	500	13
SM-3, SM-26, SM-28, SM-46, LSM6	300	13
SM-22	2000	13
SM-52	2500	13
SM-68, SM-74, SM-106, SM-108	500	13
SM-87, SM-89, SM-134	900	13
SOIC-8 (SO-8)	1000 3000 2000 (E-Series)	7 13 13
SOIC 14 (SO-14), SOIC 16 (SO-16)	1000 3000	7 13
SOW-16 (SOIC-16 Wide Body), SOW-24 (SOIC-24 Wide Body)	1000	13
SSOP-8	900 3000	7 13
SSOP-20, SSOP-24, SSOP-28	1000	13
TSSOP-16, TSSOP-16EP	1000 2500	7 13

3. See individual data sheets for part number ordering information.

4. Most device in tape and reel must be ordered in multiples of 100 pieces, with a minimum order quantity of either 200 or 500 pieces per part number. Consult factory for individual package types.