TAPE AND REEL PACKAGING

Introduction

The electronics industry is making a tremendous investment in surface-mount technology. The reasons for this investment include cost savings resulting from automated component placement and increased density of PCB layout due to smaller package sizes.

Today's placement machines can pick and place thousands of components per hour with a very high degree of accuracy. To achieve this performance, the component delivery system must be capable of feeding parts at high speeds in a consistent orientation, positively indexed to the demands of the machine. The leads of the components must be protected from damage during shipment, handling, and placement.

The preferred packing material available today for these demands is tape and reel. Analog Devices' tape and reel system is fully compatible with the detaping equipment that is standard in most automated placement equipment.

In the tape and reel format, the components are placed in specifically designed pockets embossed in a plastic carrier tape. The cover tape is sealed to the carrier tape to keep the parts in place in these pockets. A row of sprocket holes is provided along one edge of the embossed tape to facilitate positive indexing. The tape is then wound onto a rigid plastic reel that provides mechanical protection during handling and storage. These reels are dust-free and compatible with a clean environment.

Specifications

Analog Devices' tape and reel specifications are in conformance with the EIA Standard 481 "Taping of Surface-Mount Components for Automatic Placement."

ESD Protection

Analog Devices' tape and reel delivery system is designed to offer a very high degree of protection against electrostatic discharge (ESD). All tape and reel materials are static-dissipative. In addition, drypacked reels are shipped in moisture barrier bags; nondrypacked reels are shipped in a box with ESD conductive coating or in a conductive ESD bag. To retain the benefits of this protection, the bags should be opened only at ESD controlled workstations by trained personnel.

Peel Back Strength

The peel back force will be between 10 g and 100 g for 8 mm wide tape and 10 g to 130 g for tapes 12 mm and wider when tested at room temperature and pulled at a 175° to 180° angle with a peel-off speed of 300 ± 10 mm/min.

Direction of Feed

Direction of feed is defined as the direction in which the end user unreels the tape. The direction of feed for all products is counterclockwise when the reel is held with the round sprocket holes facing the observer.

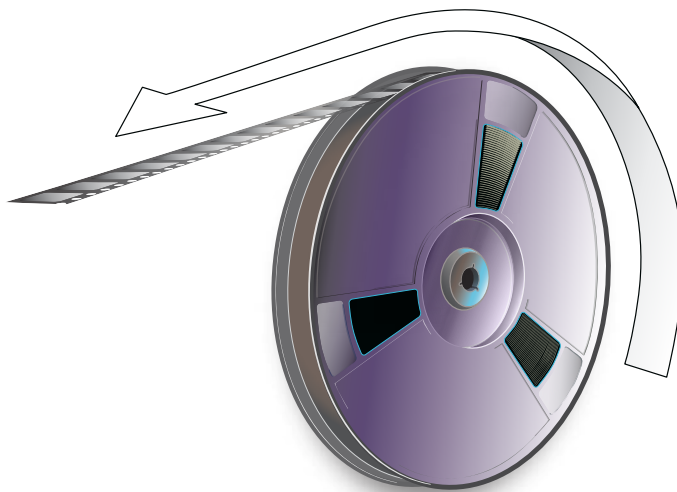

Figure 1. Direction of feed.

Pin 1 Orientation

Devices are reeled so that Pin 1 is oriented properly with the direction of feed and round sprocket holes. Pin 1 orientation is denoted as C1 to C4, or M1, with respect to the direction of feed and round sprocket holes, as illustrated below.
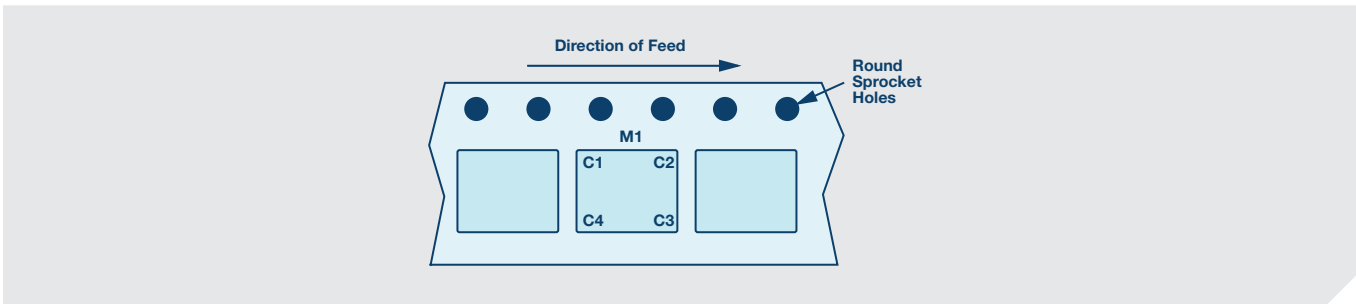

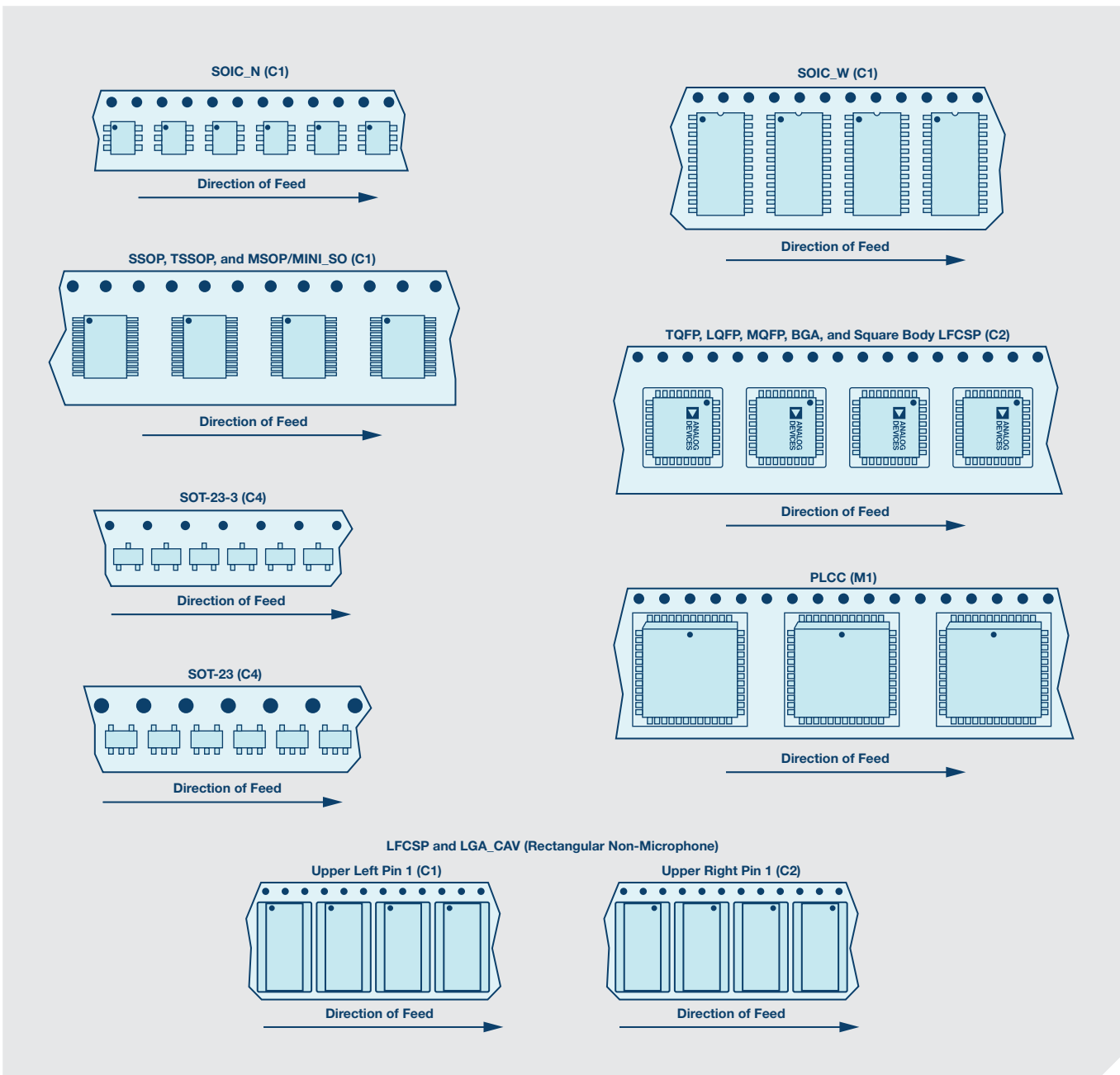
Figure 2. Pin 1 orientation reference.

Figure 3. Examples of standard Pin 1 orientation.

Table 1. Standard Package Tape and Reel (See Page 7 for Reel Definitions)

Device Package Type	Package Designator	Body Size (mm)	Number of Leads	Reel Quantity			Tape Width (mm)	Tape Pitch (mm)	Pin 1 Orientation
				7" Reel	13" Reel (4" Hub)	13" Reel (6" Hub)			
PLCC	P	N/A	20	250	1000	N/A	16	12	M1
PLCC	P	N/A	28, 32	Not offered	750	N/A	24	16	M1
PLCC	P	N/A	44	Not offered	500	N/A	32	24	M1
PLCC	P	N/A	68	Not offered	N/A	250	44	32	M1
PLCC	P	N/A	84	Not offered	N/A	250	44	36	M1
JLCC	J	N/A	28	Not offered	250	N/A	24	16	M1
JLCC	J	N/A	44	Not offered	500	N/A	32	24	M1
LCC	E	N/A	8	250	3000	N/A	12	8	M1
LCC	E	N/A	14	500	2000	N/A	16	12	C2
LCC_V	EY	9 × 9	All counts	Not offered	500	N/A	24	12	C4
SOIC_N/SOIC_N_EP	R/RD	N/A	8	1000	2500	N/A	12	8	C1
SOIC_N/SOIC_N_EP	R/RD	N/A	14, 16	1000	2500	N/A	16	8	C1
QSOP	RQ/RC	N/A	16	1000	2500	N/A	12	8	C1
QSOP	RQ	N/A	20, 24, 28	1000	2500	N/A	16	8	C1
SOIC_W_FP	RN	N/A	28	400	1000	N/A	16	12	C1
SOIC_W/SOIC_W_BAT	RW/RB	N/A	14, 16	400	1000	N/A	16	12	C1
SOIC_W/SOIC_W_BAT	RW/RB	N/A	18	400	1000	N/A	24	16	C1
SOIC_W/SOIC_W_BAT	RW/RB	N/A	20, 24	400	1000	N/A	24	12	C1
SOIC_W/SOIC_W_BAT	RW/RB	N/A	28	400	1000	N/A	32	12	C1
SOIC_CAV	RG	N/A	16	Not offered	500	N/A	24	16	C1
SOIC_IC	RI	N/A	6	400	1500	N/A	16	12	C1
SOIC_IC	RI	N/A	8	400	1500	N/A	16	12	C1
SOIC_IC	RI	N/A	16	400	1000	N/A	24	12	C1
SOIC_IC	RI	N/A	20	400	1000	N/A	24	12	C1
SSOP	RS	N/A	16, 20, 24	500	1500	N/A	16	12	C1
SSOP	RS	N/A	28	500	1500	N/A	24	12	C1
PSOP2	RP	N/A	20, 28	200	1000	N/A	24	12	C1
PSOP3	RR	N/A	20	Not offered	750	N/A	24	20	C1
SOT-23-3	RT	N/A	3	3000	10,000	N/A	8	4	C4
SOT-23[1]	RJ/RT	N/A	5, 6, 8	3000	10,000	N/A	8	4	C4
SOT-66	RY	N/A	5, 6	3000	N/A	N/A	8	4	C4
SOT-143	RA	N/A	4	3000	10,000	N/A	8	4	C4
TSOT	UJ	N/A	5, 6, 8	3000	10,000	N/A	8	4	C4
SOT-223	KC	N/A	3	500	2500	N/A	16	12	C4
SC70	KS	N/A	3, 4, 5, 6	3000	10,000	N/A	8	4	C4
SOT-89	RK	N/A	3	1000	3000	N/A	12	8	C1
TSSOP_4.4	RU/RE	N/A	8, 14, 16, 20, 24, 28, 38	1000	2500	N/A	16	8	C1
TSSOP_6.1	RV	N/A	28, 48	Not offered	2500	N/A	24	12	C1
MSOP/MINI_SO	RM/RH	N/A	8, 10	1000	3000	N/A	12	8	C1
CERPAK	QC	N/A	14	Not offered	750	N/A	24	16	C1
TQFP	SU/SV	7 × 7 × 1.0	All counts	500	2000	Not offered	16	12	C2
TQFP	SU/SV	10 × 10 × 1.0	All counts	Not offered	1500	Not offered	24	16	C2
TQFP	SU/SV	12 × 12 × 1.0	All counts	Not offered	1000	Not offered	24	24	C2

Table 1. Standard Package Tape and Reel (Continued) (See Page 7 for Reel Definitions)

Device Package Type	Package Designator	Body Size (mm)	Number of Leads	Reel Quantity			Tape Width (mm)	Tape Pitch (mm)	Pin 1 Orientation
				7" Reel	13" Reel (4" Hub)	13" Reel (6" Hub)			
TQFP	SU/SV	14 × 14 × 1.0	All counts	Not offered	1000	Not offered	32	24	C2
LQFP	ST	7 × 7 × 1.4	All counts	500	2000	Not offered	16	12	C2
LQFP	ST/SW	10 × 10 × 1.4	All counts	Not offered	1500	Not offered	24	16	C2
LQFP	ST	12 × 12 × 1.4	All counts	Not offered	1000	Not offered	24	24	C2
LQFP	ST/SW	14 × 14 × 1.4	All counts	Not offered	1000	Not offered	32	24	C2
LQFP	ST	14 × 20 × 1.4	All counts	Not offered	1000	Not offered	44	24	C1
LQFP	ST/SW	20 × 20 × 1.4	All counts	Not offered	500	Not offered	44	32	C2
LQFP	ST/SW	24 × 24 × 1.4	All counts	Not offered	450	Not offered	44	32	C2
MQFP	S	10 × 10 × 2.0	All counts	Not offered	800	Not offered	24	24	C2
MQFP	S	14 × 14 × 2.0	All counts	Not offered	600	Not offered	32	24	C2
MQFP[2]	S	14 × 14 × 2.7	All counts	Not offered	500[2]	Not offered	32	24	C2
CSP_BGA	BC	5 × 5	All counts	Not offered	4000	Not offered	12	8	C2
CSP_BGA	BC	6 × 6	All counts	Not offered	2500	Not offered	12	8	C2
CSP_BGA	BC	7 × 7	All counts	Not offered	2000	Not offered	16	12	C2
CSP_BGA	BC	8 × 8	All counts	Not offered	2000	Not offered	16	12	C2
CSP_BGA	BC	9 × 9	All counts	500	2000	Not offered	16	12	C2
CSP_BGA	BC	10 × 10	All counts	400	1500	Not offered	24	16	C2
CSP_BGA	BC	11 × 11	All counts	Not offered	1500	Not offered	24	16	C2
CSP_BGA	BC	12 × 12	All counts	Not offered	1500	Not offered	24	16	C2
CSP_BGA	BC	13 × 13	All counts	Not offered	1000	Not offered	24	24	C2
CSP_BGA	BC	15 × 15	All counts	Not offered	1000	Not offered	24	24	C2
CSP_BGA	BC	17 × 17	All counts	Not offered	1000	Not offered	24	24	C2
CSP_BGA	BC	19 × 19	All counts	Not offered	Not offered	700	32	24	C2
CSP_BGA_EM	BE	5 × 5	81	Not offered	4000	Not offered	12	8	C2
WLBGA/eWLB[3]	BF	5 × 5	81, 94	Not offered	4000	Not offered	12	8	C2
BGA	B	19 × 19	All counts	Not offered	Not offered	700	32	24	C2
BGA	B	23 × 23	All counts	Not offered	Not offered	450	44	32	C2
BGA	B	27 × 27	All counts	Not offered	Not offered	450	44	32	C2
BGA	B	35 × 35	All counts	Not offered	Not offered	300	56	40	C2
BGA_ED	BP	10 × 10	All counts	Not offered	1500	Not offered	24	16	C2
BGA_ED	BP	12 × 12	196	Not offered	1500	Not offered	24	16	C2
CBGA	BG	7 × 7	32 balls	Not offered	500	Not offered	16	12	C2
LGA	CC	3 × 3	All counts	1500	5000	Not offered	12	8	C2
LGA	CC	3 × 3.25	All counts	1500	5000	Not offered	12	8	C1
LGA	CC	3 × 5	All counts	1500	5000	Not offered	12	8	C1
LGA	CC	3.5 × 4.5	24	1500	5000	Not offered	12	8	C1
LGA	CC	5 × 5	8, 20	1000	4000	Not offered	12	8	C2
LGA	CC	5 × 5	13	1000	4000	Not offered	12	8	C1
LGA	CC	5 × 4	All counts	1000	Not offered	Not offered	12	8	C2
LGA	CC	6 × 8	All counts	1000	4000	Not offered	16	8	C1
LGA	CC	7 × 7 × 0.96	32	750	2500	Not offered	16	12	C2
LGA	CC	8 × 4	24	1000	5000	Not offered	16	12	C2
LGA	CC	8 × 10	All counts	Not offered	2000	Not offered	24	12	C1
LGA	CC	10 × 10	All counts	Not offered	2000	Not offered	24	12	C2

Table 1. Standard Package Tape and Reel (Continued) (See Page 7 for Reel Definitions)

Device Package Type	Package Designator	Body Size (mm)	Number of Leads	Reel Quantity			Tape Width (mm)	Tape Pitch (mm)	Pin 1 Orientation
				7" Reel	13" Reel (4" Hub)	13" Reel (6" Hub)			
LGA	CC	11 × 11	All counts	Not offered	1500	Not offered	24	16	C2
LGA_CAV	CE	3.35 × 2.5 × 1.0	3	1000	10000	Not offered	12	4	C3
LGA_CAV	CE	3.35 × 2.5 × 0.98	3	1000	10000	Not offered	12	4	C3
LGA_CAV	CE	3.35 × 2.5 × 0.92	3	1000	10000	Not offered	12	4	C3
LGA_CAV	CE	3.35 × 2.5 × 0.88	3	1000	10000	Not offered	12	4	C3
LGA_CAV	CE	3.76 × 4.72 × 1.0	6	1000	4500	Not offered	12	8	C3
LGA_CAV	CE	3.76 × 4.72 × 0.98	9	1000	4500	Not offered	12	8	C3
LGA_CAV	CE	3.76 × 4.72 × 3.5	6	500	2000	Not offered	12	8	C3
LGA_CAV	CE	4 × 3 × 1.2	16	1000	4000	Not offered	12	8	C2
LGA_CAV	CE	5 × 2.8 × 1.2	12	1000	4000	Not offered	12	8	C1
LGA_CAV	CE	5 × 2.8 × 1.45	12	1000	4000	Not offered	12	8	C1
LGA_CAV	CE	5.8 × 4.5 × 1.2	18	1000	4000	Not offered	12	8	C1
LGA_CAV	CE	6.5 × 2.8 × 1.2	14	1000	4000	Not offered	16	8	C1
LGA_CAV	CE	6.5 × 2.8 × 1.55	14	1000	4000	Not offered	16	8	C1
LFCSP	CP	1.3 × 1.6 × 0.55	All counts	3000	10,000	Not offered	8	4	C1
LFCSP	CP	1.6 × 1.6 × 0.55	6	3000	10,000	Not offered	8	4	C2
LFCSP	CP	2 × 2 × 0.55	All counts	3000	10,000	Not offered	8	4	C2
LFCSP	CP	2.1 × 2.1 × 0.55	All counts	3000	10,000	Not offered	8	4	C1
LFCSP	CP	2 × 3 × 0.65	8	3000	10,000	Not offered	12	4	C2
LFCSP	CP	2 × 3 × 0.75	All counts	3000	10,000	Not offered	12	4	C2
LFCSP	CP	3 × 2 × 0.75	All counts	3000	10,000	Not offered	12	4	C1
LFCSP	CP	3 × 2 × 0.85	All counts	3000	10,000	Not offered	12	4	C1
LFCSP	CP	3 × 3 × 0.85	All counts	1500	5000	Not offered	12	8	C2
LFCSP	CP	3 × 3 × 0.75	All counts	1500	5000	Not offered	12	8	C2
LFCSP	CP	3 × 3 × 0.55	All counts	1500	5000	Not offered	12	8	C2
LFCSP	CP	3 × 3 × 0.65	8	1000	5000	Not offered	12	8	C2
LFCSP	CP	3 × 3 × 1.45	All counts	1000	4000	Not offered	12	8	C2
LFCSP	CP	3.5 × 3.5 × 0.75	24	1500	Not offered	Not offered	12	8	C2
LFCSP	CP	3 × 5 × 1.45	All counts	1000	4000	Not offered	12	8	C1
LFCSP	CP	4 × 3 × 0.65	10	1000	5000	Not offered	12	8	C2
LFCSP	CP	4 × 3 × 0.75	14	1500	5000	Not offered	12	8	C1
LFCSP	CP	4 × 4 × 0.65	10	1000	5000	Not offered	12	8	C2
LFCSP	CP	4 × 4 × 0.75	All counts	1500	5000	Not offered	12	8	C2
LFCSP	CP	4 × 4 × 0.85	All counts	1500	5000	Not offered	12	8	C2
LFCSP/LFCSP_SS	CP/CS	4 × 4 × 1.45	All counts	1000	4000	Not offered	12	8	C2
LFCSP	CP	4 × 5 × 0.75	All counts	1500	5000	Not offered	12	8	C1
LFCSP	CP	4 × 5 × 0.90	All counts	1500	5000	Not offered	12	8	C1
LFCSP	CP	4 × 5 × 0.95	All counts	1500	5000	Not offered	12	8	C1
LFCSP/LFCSP_SS	CP/CS	5 × 5 × 0.75	All counts	1500	5000	Not offered	12	8	C2
LFCSP	CP	5 × 5 × 0.85	All counts	1500	5000	Not offered	12	8	C2
LFCSP	CP	5 × 5 × 0.90	All counts	1500	5000	Not offered	12	8	C2
LFCSP	CP	5 × 5 × 0.95	All counts	1500	5000	Not offered	12	8	C2
LFCSP	CP	5 × 5 × 1.45	All counts	1000	4000	Not offered	12	8	C2
LFCSP	CP	5 × 5 × 1.8	All counts	1000	4000	Not offered	12	8	C2

Table 1. Standard Package Tape and Reel (Continued) (See Page 7 for Reel Definitions)

Device Package Type	Package Designator	Body Size (mm)	Number of Leads	Reel Quantity			Tape Width (mm)	Tape Pitch (mm)	Pin 1 Orientation
				7" Reel	13" Reel (4" Hub)	13" Reel (6" Hub)			
LFCSP	CP	5 ×4 × 0.75	All counts	1500	5000	Not offered	12	8	C2
LFCSP	CP	5 × 4 × 0.95	All counts	1500	5000	Not offered	12	8	C2
LFCSP	CP	5 × 4 × 1.45	24	1000	5000	Not offered	12	8	C2
LFCSP	CP	6 × 6 × 0.75	All counts	750	2500	Not offered	16	12	C2
LFCSP	CP	6 × 6 × 0.85	All counts	750	2500	Not offered	16	12	C2
LFCSP	CP	6 × 6 × 0.95	All counts	750	2500	Not offered	16	12	C2
LFCSP/LFCSP_SS	CP/CS	7 × 7 × 0.75	All counts	750	2500	Not offered	16	12	C2
LFCSP	CP	7 × 7 × 0.85	All counts	750	2500	Not offered	16	12	C2
LFCSP	CP	7 × 7 × 0.95	All counts	750	2500	Not offered	16	12	C2
LFCSP	CP	8 × 7 × 0.75	All counts	750	2500	Not offered	16	12	C2
LFCSP	CP	8 × 8 × 0.75	All counts	750	2500	Not offered	16	12	C2
LFCSP	CP	8 × 8 × 0.85	All counts	750	2500	Not offered	16	12	C2
LFCSP	CP	9 × 9 × 0.75	All counts	750	2500	Not offered	16	12	C2
LFCSP	CP	9 × 9 × 0.85	All counts	750	2500	Not offered	16	12	C2
LFCSP	CP	9 × 9 × 0.95	All counts	750	2500	Not offered	16	12	C2
LFCSP	CP	10 × 10 × 0.85	All counts	400	2000	Not offered	24	16	C2
LFCSP	CP	12 × 12 × 0.80	All counts	400	2000	Not offered	24	16	C2
LFCSP	CP	12 × 12 × 0.85	All counts	400	2000	Not offered	24	16	C2

[1]For SOT-23 packages with greater than three leads, use the RJ designator.
[2]Advantek part number Q14X14-HHX52.0P2 is the only approved carrier tape for this package. When boxing this reel, dunnage (crumpled kraft paper) shall be used between the reel.
[3]For bumped die or WLCSP packages, see Table 2. Orientation for these devices is as per EIA-783 (bumps facing bottom of carrier cavity; Pin 1 toward sprocket holes).

Table 2. Hittite Standard Package Tape and Reel (See Page 7 for Reel Definitions)

Device Package Type	Package Designator	Body Size (mm)	Number of Leads	Reel Quantity			Tape Width (mm)	Tape Pitch (mm)	Pin 1 Orientation
				7" Reel	13" Reel (4" Hub)	13" Reel (6" Hub)			
LGA	CC	3 × 3	All counts	500	Not offered	Not offered	12	8	C1
LGA	CC	4 × 4	All counts	500	Not offered	Not offered	12	8	C1
LFCSP	CP	2 × 2 × 0.90	All counts	500	Not offered	Not offered	8	4	C1
LFCSP	CP	3 × 3 × 0.90	All counts	500	Not offered	Not offered	12	4	C1
LFCSP	CP	4 × 4 × 0.90	All counts	500	Not offered	Not offered	12	8	C1
LFCSP	CP	5 × 5 × 0.90	All counts	500	Not offered	Not offered	12	8	C1
LFCSP	CP	5 × 5 × 1.35	All counts	500	Not offered	Not offered	12	8	C1
LFCSP	CP	6 × 6 × 0.75	All counts	500	Not offered	Not offered	16	12	C1
LFCSP	CP	6 × 6 × 0.85	All counts	500	Not offered	Not offered	16	12	C1
LFCSP	CP	6 × 6 × 0.90	All counts	500	Not offered	Not offered	16	12	C1
LFCSP	CP	7 × 7 × 0.85	All counts	500	Not offered	Not offered	16	12	C1
LFCSP	CP	10 × 10 × 0.90	All counts	500	Not offered	Not offered	16	12	C1
LCC_HS	EP	6 × 6 × 1.317	All counts	500	Not offered	Not offered	16	12	C1
LCC_HS	EP	7 × 7 × 1.317	All counts	500	Not offered	Not offered	16	12	C1
LCC	E	3 × 3	All counts	100/500	Not offered	Not offered	12	4	C1
LCC	E	4 × 4	All counts	100/500	Not offered	Not offered	12	8	C1
LCC	E	5 × 5	All counts	100/500	Not offered	Not offered	12	8	C1
QSOP	RQ	N/A	All counts	500	Not offered	Not offered	12	8	C1
MSOP	RM	N/A	All counts	500	Not offered	Not offered	12	8	C1
SOT-89	RK	N/A	All counts	500	Not offered	Not offered	12	8	C1
SOT-23	RJ	N/A	All counts	500	Not offered	Not offered	12	8	C1

Table 3. WLCSP/Bumped Die Sales Tape and Reel

Device Package Type	Package Designator	Body Size (mm)	Reel Quantity		Tape Width (mm)	Tape Pitch (mm)	Pin 1 Orientation
			7" Reel	13" Reel (4" Hub)			
WLCSP	CB	NA	3000 (max)	10,000 (max)	8	4	C1, C2, C3, or C4
					12	8	
Bumped chip	CD	NA	3000 (max)	10,000 (max)	8	4	
					12	8	

Table 4. Small Quantity Reel

Device Package Type	Package Designator	Body Size (mm)	Number of Leads	Reel Quantity 7" Reel	Tape Width (mm)	Tape Pitch (mm)	Pin 1 Orientation
LFCSP	CP	2 × 2 × 0.55	All counts	250	8	4	C2
LFCSP	CP	2 × 3	All counts	500	12	4	C2
LFCSP	CP	3 × 2	All counts	250	12	4	C1
LFCSP	CP	3 × 3	All counts	250	12	8	C2
LFCSP	CP	4 × 4	All counts	250	12	8	C2
LFCSP	CP	4 × 4	16	500	12	8	C2
LFCSP	CP	5 × 5	All counts	250	12	8	C2
MSOP/MINI_SO	RM	N/A	8, 10	250	12	8	C1
QSOP	RQ	150_MIL	16	500	12	8	C1
SC70	KS	N/A	3, 4, 5, 6	250	8	4	C4
SOT-23-3	RT	N/A	3	250	8	4	C4
SOT-23[1]	RJ/RT	N/A	5, 6, 8	250	8	4	C4
SOT-143	RA	N/A	4	250	8	4	C4
TSOT	UJ	N/A	5, 6, 8	250	8	4	C4
TSSOP_4.4	RU/RE	N/A	16, 20, 24	500	16	8	C1
WLCSP[2]	CB	N/A	All counts	250	See Table 2	See Table 2	See Table 2

[1] For SOT-23 packages prior to Rev. W, all products and lead counts use RT. For SOT-23 packages from Rev. W, all new products with greater than three leads use the RJ designator.
[2] For actual WLCSP products available in small quantity reels, please cross reference with "7" reel (small quantity)" column of Table 2.

Glossary

REEL7 (aka R7 or RL7)

This is a 7" reel. Quantities vary based on package size.

Reel (aka RL or R)

This is a 13" reel. Quantities vary based on package size.

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