



CHAPTER 9 TUBES

Introduction

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INTRODUCTION

Tubes are used as unit carriers for most of AMD’s lower lead-count packages. For information on which package families are shipped in tubes as a standard, see *Chapter 1 Codes and Carrier Options* in the Overview Publication.

DESIGN AND MATERIALS

All of AMD’s tubes are made of an antistatically coated PVC to protect product from electrical and mechanical damage. Tube sizes are standardized by package type to facilitate automated board assembly.



Figure 9.1 AMD uses a variety of tubes to protect select package types.

Device Loading. Devices are loaded into tubes with each device pin one uniformly oriented, as illustrated in the tube dimension drawings beginning on *page 9-4*. A variety of end-plug designs, all made of antistatic material, secures products in the tube and helps minimize excessive product movement during shipping and handling. These end-plug designs help to protect the mechanical integrity of the package and leads and ensure an unimpaired dispensing of product for manufacturing operations.

DEVICE COUNT PER TUBE AND BOX

The quantity of devices per tube are standardized across all AMD products by the package family and lead-count. These standard quantities are listed below. AMD encourages, but does not require, ordering in full tube quantities.

Device Count per Tube and Box

Package	Leadcount	Devices per Tube	Tube per Box	Devices per Box
Plastic Dual-In-Line (PD, PD3)	16 PD	25	10	250
	18 PD	20	12	240
	20 PD	18	15	270
	22 PD	15	16	240
	24 PD (600 mil)			
	24 PD3 (300 mil)			
	28 PD (600 mil)	13	10	130
	28 PD3 (300 mil)			
	32 PD	11	15	165
	40 PD	9	15	135
48 PD	7	10	70	

Device Count per Tube and Box (Continued)

Package	Leadcount	Devices per Tube	Tube per Box	Devices per Box
Plastic Leaded Chip Carrier (PL, PLH)	20 PL	46	10 ¹	460 ¹
	28 PL, PLH	37	15 ²	555 ²
	32 PL	30	8 ³	1200 ³
	44 PL	26	10 ⁴	1040 ⁴
	68 PL, PLH	18	15 ⁵	810 ⁵
	84 PL, PLH	15	16 ⁶	720 ⁶
Shrink Small Outline Package (SSO) ⁷	20 SSO	67	14	938
	24 SSO	59	16	944
Small Outline Package (SO, SOW)	16 SO (150 mil)	48	10	480
	20 SO	38	15	570
	24 SO	30	16	480
	28 SO (300 mil)	26	20	520
	28 SOW (330 mil)	26	10 ⁸	1300 ⁸
	44 SO, SOR	17	15 ⁹	1020 ⁹

Notes:

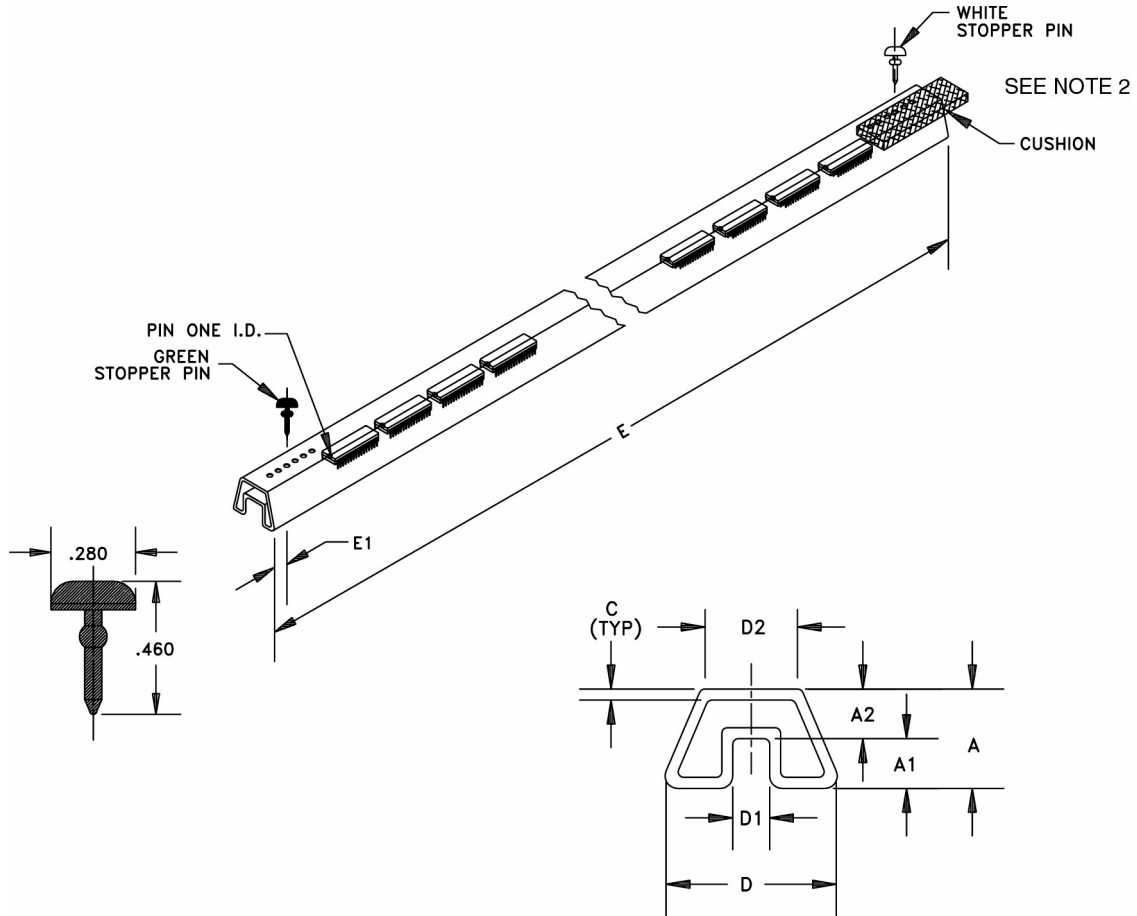
- 1 If a customer requests these to be dry packed, then there would be 5 tubes per bag, 5 bags per 4K box, for a total of 1150 devices per 4K box.
- 2 If a customer requests these to be dry packed, then there would be 10 tubes per bag, 5 bags per box, for a total of 1850 devices per 4K box.
- 3 There are 8 tubes per dry pack bag, 5 dry pack bags per box, and thus 1200 devices per 4K box.
- 4 There are 10 tubes per dry pack bag, 4 dry pack bags per box, and thus 1040 devices per 4K box.
- 5 There are 15 tubes per dry pack bag, 3 dry pack bags per box, and thus 810 devices per 4K box.
- 6 There are 16 tubes per dry pack bag, 3 dry pack bags per box, and thus 720 devices per 4K box.
- 7 Other SSO packages are offered only in trays or tape-and-reel.
- 8 There are 10 tubes per dry pack bag, 5 dry pack bags per box, and thus 1300 devices per 4K box.
- 9 There are 15 tubes per dry pack bag, 4 dry pack bags per box, and thus 1020 devices per 4K box.

TUBE DIMENSIONS

The dimensional drawings, beginning on *page 9-4*, show the dimensions of the tube for each package family and leadcount, as well as the end-stopper style and dimensions, and the device pin one orientation.

Consult your AMD sales representative for additional information about AMD's tubes.

Plastic Dual-In-Line



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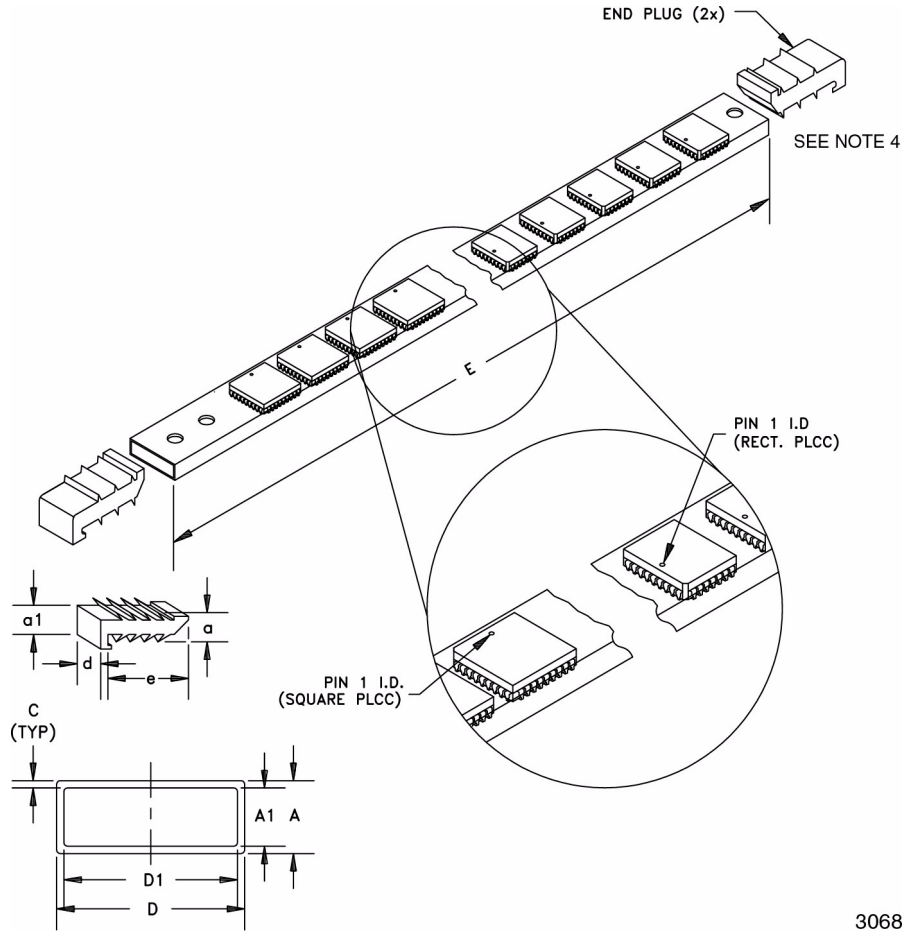
Tube Dimensions

Leadcount	Tube Wall Thickness ¹	Length ¹		Width ¹			Height ¹		
	C	E	E1	D	D1	D2	A	A1	A2
14–28 (300 mil) PD, PD3)	0.025 ± 0.005	20.0 ± 0.030	0.300	0.582	0.165	0.375	0.538	0.290	0.248
22 thru 28 (400 mil) PD4			0.400	0.715	0.280	0.468	0.545	0.280	0.265
24 thru 48 (600 mil) PD			0.400	0.850	0.435	0.670	0.512	0.265	0.247

Notes:

- 1 All dimensions are in inches, and the tolerances for them are ± 0.010 inch unless otherwise stated.
- 2 A cushion is only included if the tube is not completely full of components (i.e., a partially loaded tube).

Plastic Leaded Chip Carrier



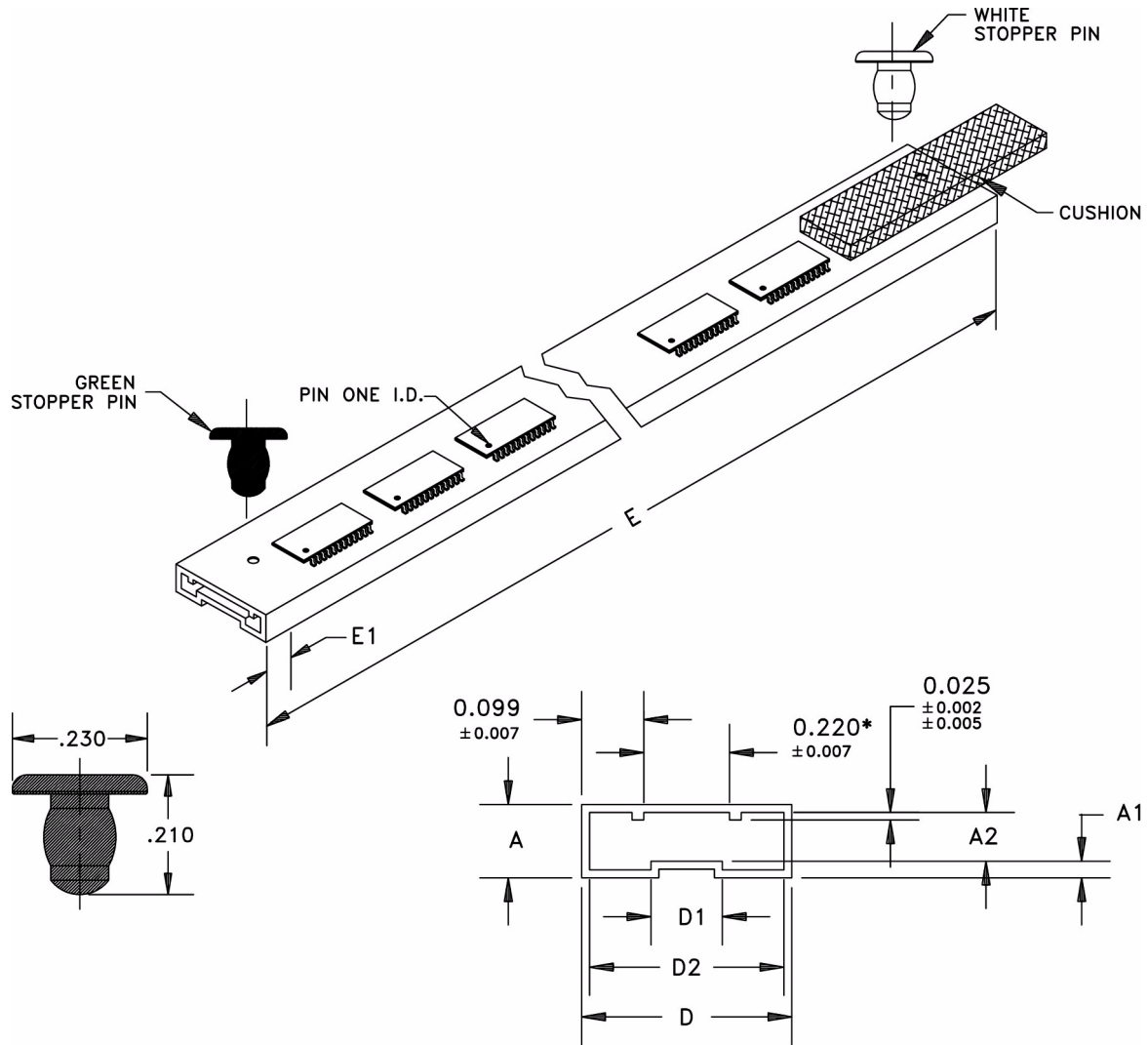
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Tube Dimensions

End-Plug Dimensions

Leadcount	Tube Wall Thickness ¹	Length ¹		Width ¹		Height ¹		Length ¹		Width ¹	Height ¹
	C	E	D	D1	A	A1	e	d	a ²	a1	
20 PL	0.025 ± 0.005	20.0 ± 0.045	0.460	0.410	0.250	0.200	1.080	0.330	0.315	0.145	
28 PL, PLH			0.560	0.510	0.250	0.200	0.960	0.410	0.288	0.150	
32 PL			0.560	0.510	0.210	0.160	1.180	0.410	0.228	0.280	
44 PL			0.760	0.710	0.260	0.210	1.080	0.600	0.315	0.290	
68 PL, PLH			1.070	1.020	0.260	0.210	1.080	0.850	0.290	0.290	
84 PL, PLH			1.280	1.230	0.270	0.220	1.080	1.180	0.315	0.290	

Shrink Small Outline Package



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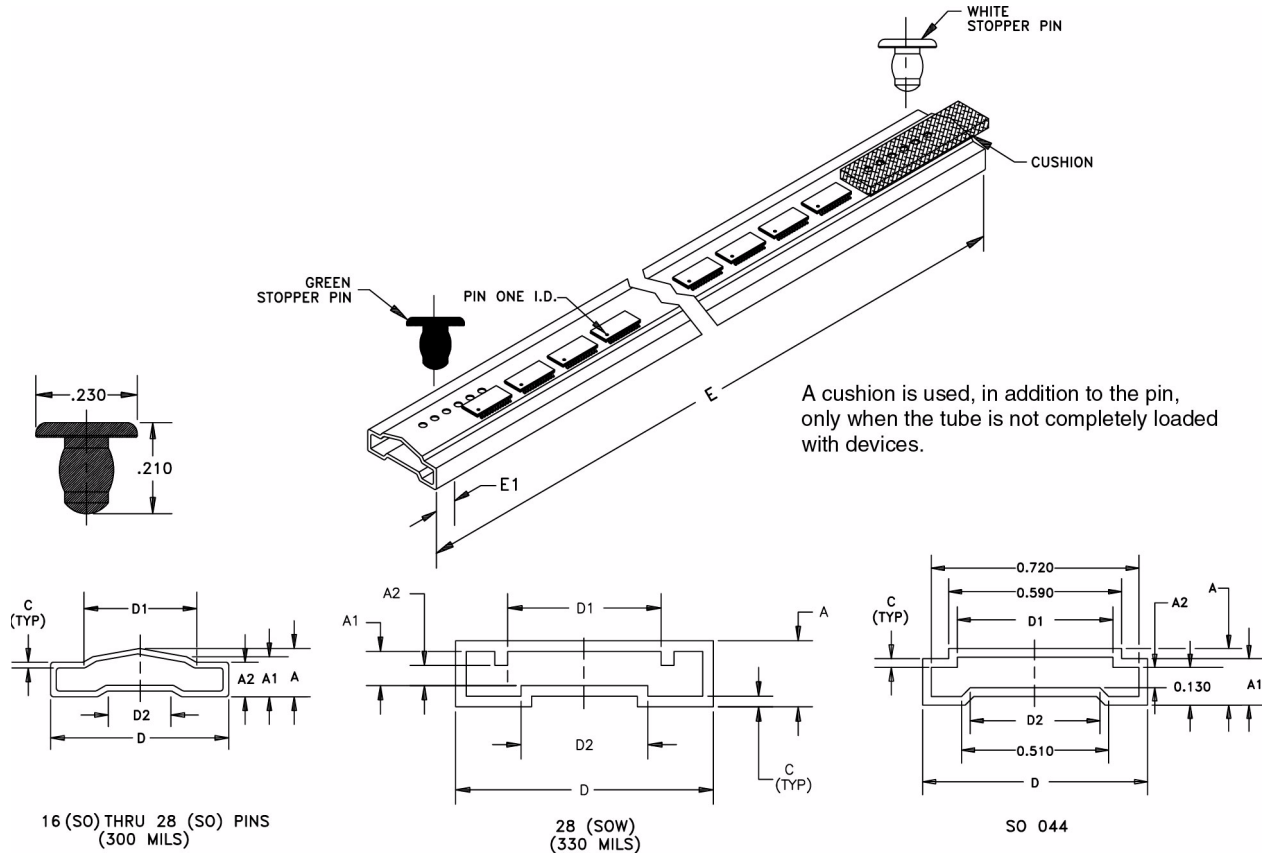
Tube Dimensions

Leadcount	Tube Wall Thickness ¹	Length ¹		Width ¹			Height ¹		
	C	E	E1	D	D1	D2	A	A1	A2
20 SSO	0.024	20.0	0.230	0.419	0.205	0.3709	0.163	0.059	0.080
24 SSO	±0.005	±0.045					±0.005	±0.005	±0.005
>24 SSO ²	N/A ²								

Notes:

- 1 All dimensions are in inches, and the tolerances for them are ± 0.010 inch unless otherwise stated.
- 2 Higher leadcounts of SSO packages are available only in trays or tape-and-reel carriers.

Small Outline Package



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Tube Dimensions

Leadcount	Tube Wall Thickness ¹	Length ¹			Width ¹			Height ¹		
	C	E	E1	D	D1	D2	A	A1	A2	
16 SO	0.030 ± 0.005	20.0 ± 0.045	0.480	0.325 ³	N/A	0.060	0.170	0.110	0.085	
20 SO			2.238							
24 SO			2.70	0.575	0.360	0.240	0.198	0.188	0.160	
28 SO			0.550							
28 SOW	0.025 ± 0.005		0.43	0.60	0.37 ³	0.34	0.18	0.105 ³	0.072 ³	
44 SO, SOR	0.030 ± 0.005		0.375	0.780	0.530	0.450	0.195	0.155	0.070	

Notes:

- 1 All dimensions are in inches, and the tolerances for them are ± 0.010 inch unless otherwise stated.
- 2 The tolerance for this dimension is +0.016 inch and -0.00 inch.
- 3 The tolerance for this dimension is ±0.008 inch.