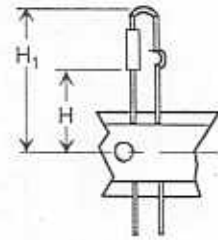
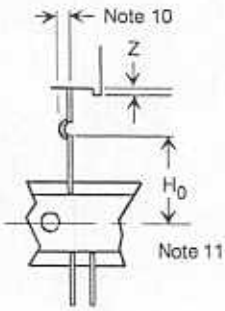
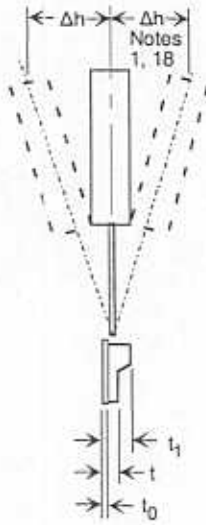
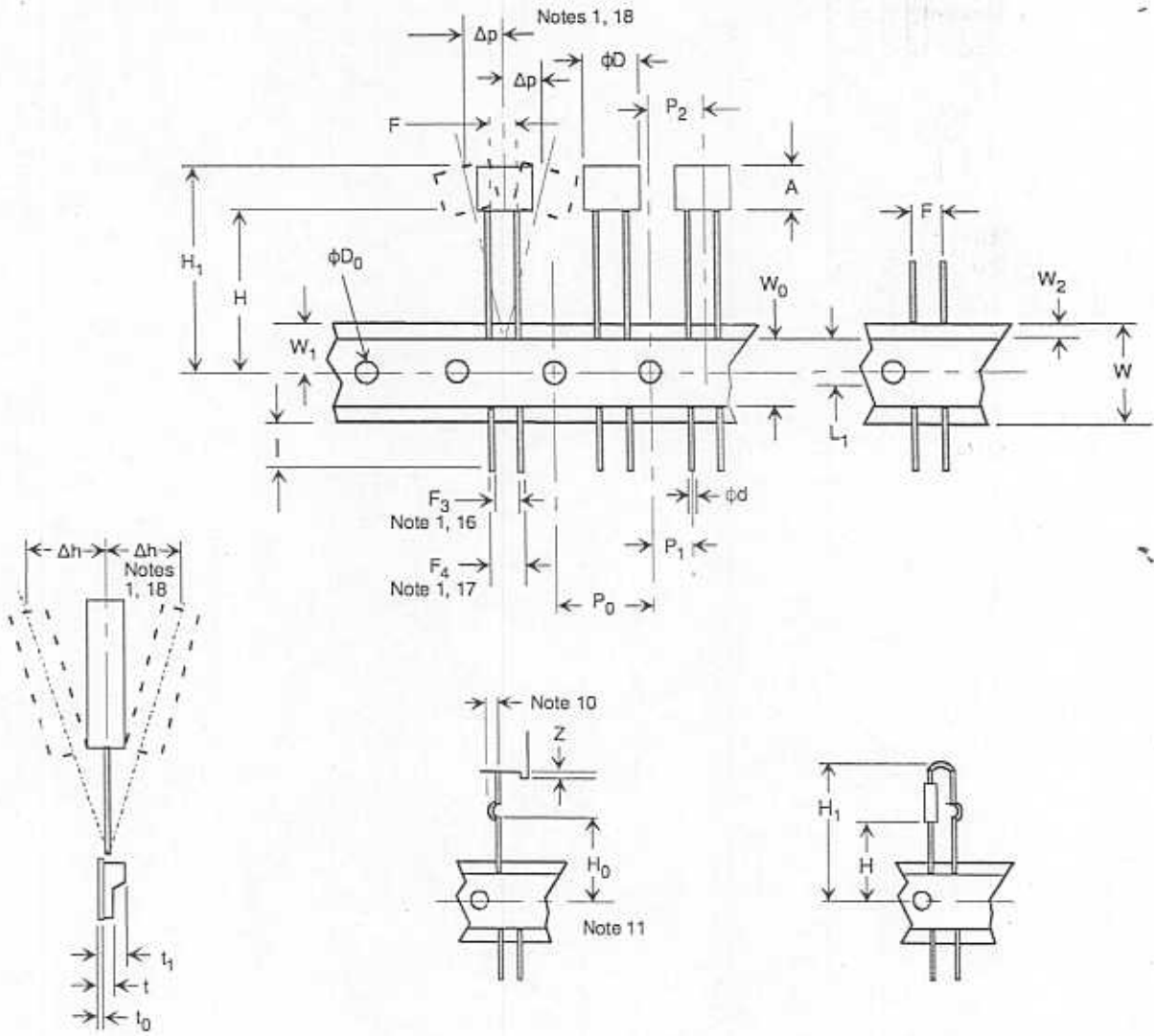


Comments to Radial Components Taping Specification.

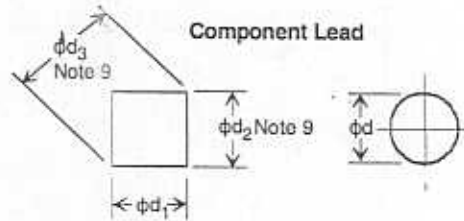
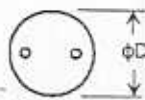
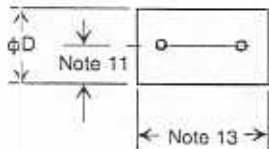
The Universal Radial Insertion Machine at Kepco is specially designed to accommodate tall components. It permits auto-insertion of two- or three-lead components of body heights from 0.197" up to 1.023". It is important to consider that TO-92, LED, connectors and male QD leads have rectangular leads. For rectangular leads the critical dimension is Lead Across Diagonal ($\phi d3$), which can not exceed 0.028". Therefore, if leads are square, their maximum dimensions can not exceed 0.020"x 0.020". This means that the designer must always verify whether a component has round or rectangular leads in order to determine the correct PCB hole diameter .

Two-Leaded Components, for 2.5mm/5.0mm Tooling



Component Body

Component Lead

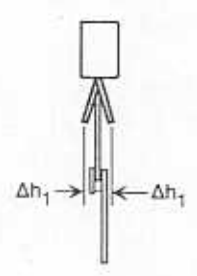
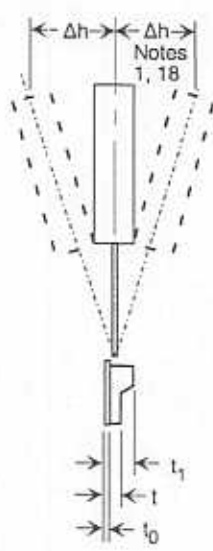
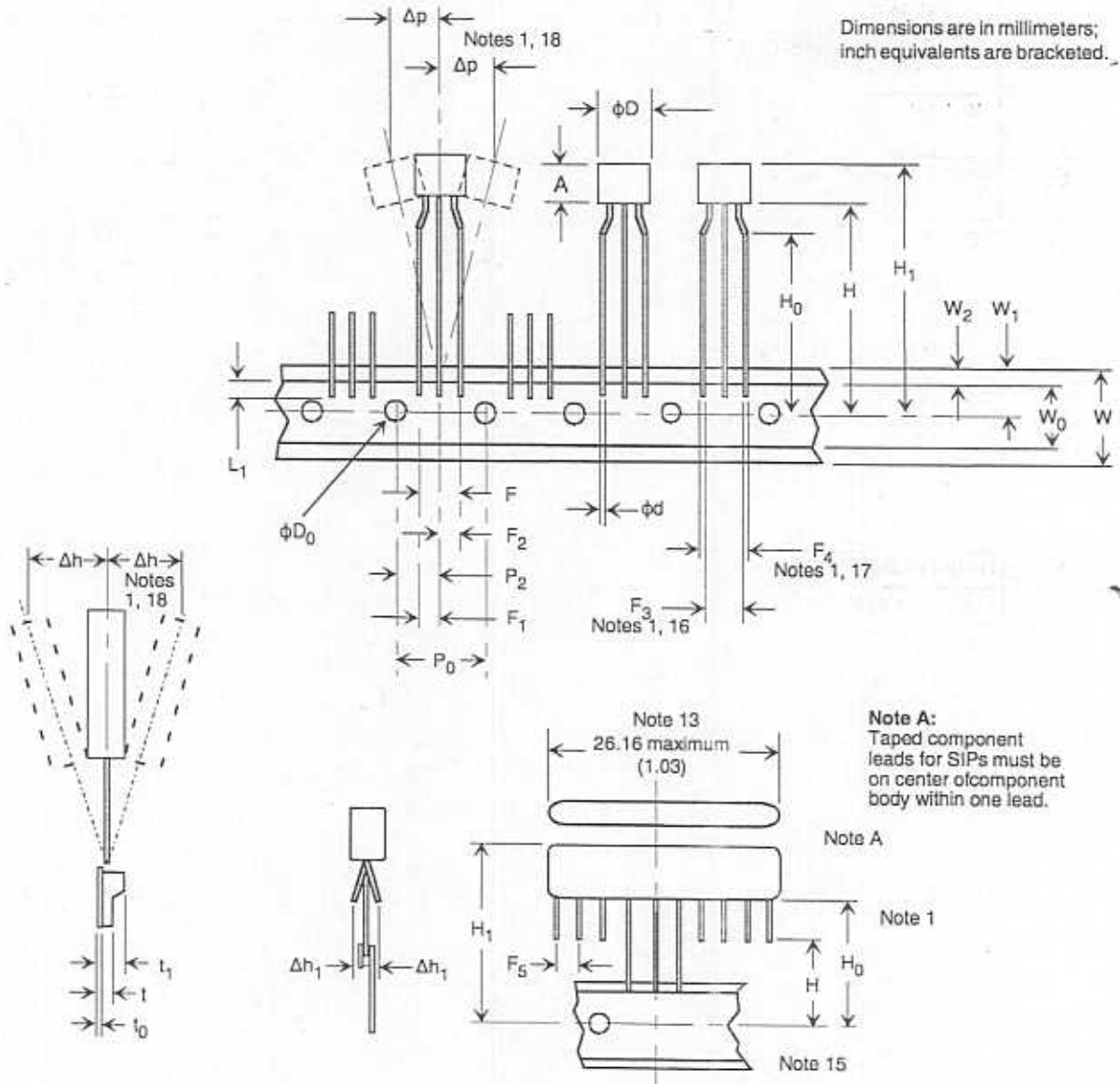


TWO-LEADED COMPONENT SPECIFICATIONS FOR 2.5mm/5.0mm TOOLING

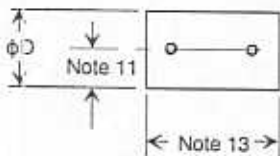
Symbol	Item	Minimum		Maximum		Notes	
		mm	inch	mm	inch		
A	Component Body Height	5.00	0.197	26.0	1.023		
ϕD	Component Body Diameter	N/A	N/A	13.0	0.512	19	
ϕD_0	Feed Hole Diameter	3.7	0.146	4.3	0.169		
ϕd	Lead Diameter (Round)	2.5mm	0.36	0.014	0.61	0.024	9, 12
		5.0mm	0.36	0.014	0.71	0.028	9, 12
ϕd_1	Lead Size (Rectangular)	2.5mm	0.36	0.014	0.50	0.020	9, 12
		5.0mm	0.28	0.011	0.66	0.026	9, 12
ϕd_2	Lead Size (Rectangular)	2.5mm	0.36	0.014	0.50	0.020	9, 12
		5.0mm	0.28	0.011	0.66	0.026	9, 12
ϕd_3	Lead Across Diagonal	2.5mm	N/A	N/A	0.61	0.024	9, 12
		5.0mm	N/A	N/A	0.71	0.028	9, 12
F	Component Lead Span	2.5mm	2.13	0.084	3.15	0.124	1, 5
		5.0mm	4.67	0.184	5.69	0.224	1, 5
F_1, F_2	Component Lead Pitch*	N/A	N/A	N/A	N/A		
F_3	Minimum Inner Spacing Between Leads	2.5mm	2.1	0.083	N/A	N/A	1, 5, 16
		5.0mm	4.34	0.171	N/A	N/A	1, 5, 16
F_4	Maximum Outer Spacing	2.5mm	N/A	N/A	3.53	0.139	
		5.0mm	N/A	N/A	6.1	0.239	
F_5	Lead Pitch	2.4	0.096	2.6	0.104		
H_0	Height of Seating Plane	15.5	0.610	22.5	0.886		
H	Feed Hole to Bottom of Component	15.5	0.610	22.5	0.886	11, 20	
H_1	Component Height	15.85	0.624	38.5	1.51	14	
Δh	Front-to-Rear Deflection	0.0	0.000	1.0	0.039	1, 18	
Δh_1	Lead Deflection *	N/A	N/A	N/A	N/A		
l	Lead Protrusion	0.0	0.000	1.0	0.039		
L	Lead Length After Component Removal	8.51	0.335	11.2	0.441	3	
L_1	Lead Wire Enclosure	2.49	0.098	18.31	0.721		
P_0	Feed Hole Pitch	12.4	0.488	13.0	0.512	4	
P_1	Lead Location	2.5mm	4.37	0.172	5.79	0.228	5
		5.0mm	3.10	0.122	4.52	0.178	5
P_2	Ordinate to Component Center	5.64	0.222	7.06	0.278	5	
Δp	Deflection Left or Right	00	0.000	1.3	0.051	1, 18	
t	Overall Tape Thickness	0.51	0.020	0.90	0.035	6	
t_0	Carrier Tape Thickness	0.38	0.015	0.69	0.027		
t_1	Total Taped Package Thickness	0.86	0.034	1.50	0.059	6	
W	Tape Width	17.5	0.689	19.0	0.748	7	
W_0	Adhesive Tape Width	5.50	0.216	19.0	0.748	7	
W_1	Feed Hole Location	8.5	0.335	9.75	0.384		
W_2	Adhesive Tape Position	0.0	0.000	6.0	0.236	7	
Z	Standoff Extensions	0.0	0.000	1.0	0.039		

* Applies to three-leaded components only.

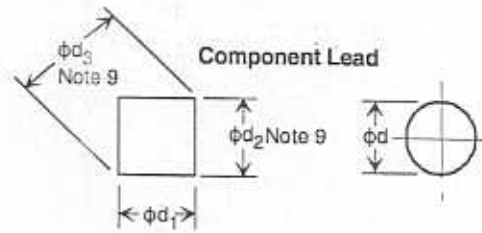
Three-Leaded Components, for 2.5mm/5.0mm Tooling



Component Body



Component Lead



THREE-LEADED COMPONENT SPECIFICATIONS FOR 2.5mm/5.0mm TOOLING

Symbol	Item	Minimum		Maximum		Notes	
		mm	inch	mm	inch		
A	Component Body Height	5.00	0.197	26.0	1.023		
ϕD	Component Body Diameter	N/A	N/A	13.0	0.512	19	
ϕD_0	Feed Hole Diameter	3.7	0.146	4.3	0.169		
ϕd	Lead Diameter (Round)	2.5mm	N/A	N/A	N/A	9, 12	
		5.0mm	0.36	0.014	0.61	0.024	9, 12
ϕd_1	Lead Size (Rectangular)	2.5mm	N/A	N/A	N/A	9, 12	
		5.0mm	0.28	0.011	0.50	0.020	9, 12
ϕd_2	Lead Size (Rectangular)	2.5mm	N/A	N/A	N/A	9, 12	
		5.0mm	0.28	0.011	0.50	0.020	9, 12
ϕd_3	Lead Across Diagonal	2.5mm	N/A	N/A	0.61	0.024	9, 12
		5.0mm	N/A	N/A	0.71	0.028	9, 12
F	Component Lead Span	2.5mm	2.13	0.084	3.15	0.124	1, 5
		5.0mm	4.67	0.184	5.69	0.224	1, 5
F_1, F_2	Component Lead Pitch	2.4	0.094	2.9	0.114		
F_3	Minimum Inner Spacing Between Leads	2.5mm	2.11	0.083	N/A	N/A	1, 5, 16
		5.0mm	4.34	0.171	N/A	N/A	1, 5, 16
F_4	Maximum Outer Spacing	2.5mm	N/A	N/A	3.53	0.139	
		5.0mm	N/A	N/A	6.1	0.239	
F_5	Lead Pitch	2.4	0.096	2.6	0.104		
H_0	Height of Seating Plane	15.5	0.610	22.5	0.886		
H	Feed Hole to Bottom of Component	15.5	0.610	22.5	0.886	11, 20	
H_1	Component Height	15.85	0.624	38.4	1.51	14	
Δh	Front-to-Rear Deflection	0.0	0.000	1.0	0.039	1, 18	
Δf_1	Lead Deflection	N/A	N/A	0.1	0.004		
I	Lead Protrusion	0.0	0.000	1.0	0.039		
L	Lead Length After Component Removal	8.51	0.335	11.2	0.441	3	
L	Lead Wire Enclosure	2.49	0.098	18.31	0.721		
P_0	Feed Hole Pitch	12.4	0.488	13.0	0.512	4	
P_1	Lead Location	2.5mm	N/A	N/A	N/A		
		5.0mm	N/A	N/A	N/A	5	
P_2	Ordinate to Component Center	5.64	0.222	7.06	0.278	5	
Δp	Deflection Left or Right	0.0	0.000	1.3	0.051	1, 18	
t	Overall Tape Thickness	0.51	0.020	0.89	0.035	6	
t_0	Carrier Tape Thickness	0.38	0.015	0.69	0.027		
t_1	Total Taped Package Thickness	0.86	0.034	1.50	0.059	6	
W	Tape Width	17.5	0.689	19.0	0.748	7	
W_0	Adhesive Tape Width	5.50	0.216	19.0	0.748	7	
W_1	Feed Hole Location	8.5	0.335	9.75	0.384		
W_2	Adhesive Tape Position	0.0	0.000	6.0	0.236	7	
Z	Standoff Extensions	0.0	0.000	1.0	0.039		

Notes:

1. Maximum alignment deviation or parallelism between leads shall not be greater than 0.2mm (0.008"). This dimension also applies to the component leads after the cardboard has been removed and to all untaped leads.
2. The distance between the tape feed hole and the bottom of the component, and the distance between the tape feed hole and the leads standoff form, shall be equal within 1.0mm (0.039").
3. When defective components are clipped from the carrier tape, the remaining protrusion of the leads shall not exceed $W_1 + 1.0\text{mm}$ ($W_1 + 0.039"$).
4. Maximum cumulative variation between tape feed holes shall not exceed + 0.5mm (+ 0.020") over four pitches.
5. P_1 and F are measured at the lead egress from the carrier tape on the component side (P_1 shall not deviate more than $\pm 0.13\text{mm}$ (0.005") on the same component reel). P_2 is measured at the seating plane.
6. Overall tape package thickness (t_1), including component leads and tape splices, shall not exceed 1.5mm (0.059").
7. Hold-down tape not to extend beyond the edge(s) of the carrier tape and there shall not be exposure of the adhesive.
8. For components with standoffs, the dimension is measured from the centerline of the feed hole to the inside radius of the form.
9. To determine which dimension to use in designing the PC board, please refer to "Component Lead Hole Considerations" section of this GS.
10. Dimension to be 0.38mm (0.015") larger than hole diameter in the board.
11. If leads are off center of component body, effective ϕD dimension = 2x distance from center line of component leads to furthest edge of component body.
12. Steel leads may not exceed 0.64mm (0.025") in diameter when using an N-type cutter head for 2.5mm/5.0mm tooling. For 2.5mm/5.0mm/7.5mm tooling, running steel leads with 0.81mm (0.032") will decrease tooling life. (See Note 9)
13. Parts longer than 12.39mm (0.488"), for example, SIP type components, must be taped 25.4mm (1") on center. Parts taped in this manner result in an increase in transfer time from dispenser head to carrier clip. Consult your Universal Sales Engineer for 15mm (0.59") or 30mm (1.18") pitch.
14. The distance between the bottom of the guide jaw to bottom of the pusher tip when in full up position is 30.73mm (1.210"). Full downward travel of the insertion pusher extends to surface of printed circuit board or top of component, whichever is greater.
15. Dimension applies to untaped leads.
16. F_3 dimension is designed to limit the minimum lead span of taped components.
17. F_4 dimension is designed to limit the maximum lead span of the taped component.
18. Component deflection (Δh , Δp) is measured from the centerline of the component at the center top of the component.
19. ϕD max is 13.0mm.