



**7.5.16 Components with Bottom Thermal Plane Terminations (D-Pak)** The thermal transfer plane acceptance criteria are design and process related. Issues to consider include but are not limited to solder coverage, voids, solder height, component supplier's application notes, etc. When soldering these types of components voiding in the thermal plane is common.

The mounting and solder requirements for SMT terminations shall [D1D2D3] meet the criteria for the type of lead termination being used.

Connections formed to components with bottom thermal plane terminations, Figure 7-17, shall [D1D2D3] meet the dimensional and solder fillet requirements of Table 7-19.

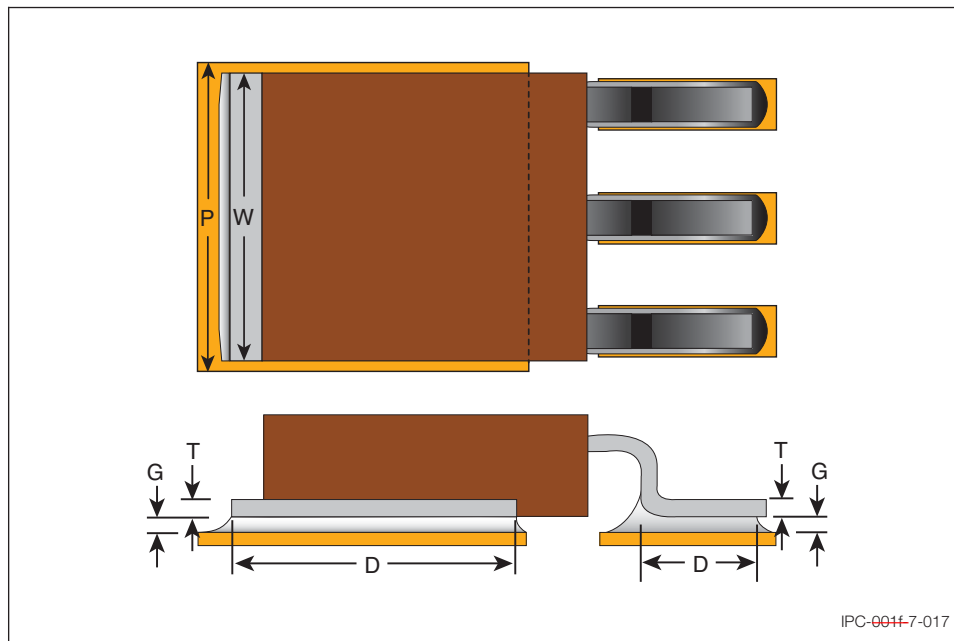
**Table 7-19 Dimensional Criteria – Bottom Thermal Plane Terminations**

Feature (all connections except thermal plane)	Dim.	Criteria for the type of lead termination being used.
Maximum Side Overhang	A	
Toe Overhang	B	
Minimum End Joint Width	C	
Minimum Side Joint Length	D	
Maximum Heel Fillet Height	E	
Minimum Heel Fillet Height	F	
Solder Fillet Thickness	G	
Lead Thickness	T	
Feature (only for the thermal plane connection)		Class 1,2,3
Thermal Plane Side Overhang		Not greater than 25% of termination width.
Thermal Plane End Overhang		No overhang.
Thermal Plane Minimum End Joint Width, Note 2		100% wetting to land in the end-joint contact area.
Thermal Plane Side Joint Length	D	Note 1
Thermal Plane Solder Fillet Thickness	G	Wetting is evident when a fillet is present.
Thermal Plane Void Criteria		Note 1
Thermal Plane Termination Width	W	Note 2
Thermal Plane Land Width	P	Note 3

**Note 1:** Acceptance criteria will need to be established between the Manufacturer and User.

**Note 2:** Solder wetting is not required on trimmed edges of a thermal plane that expose non-wettable vertical surfaces.

**Note 3:** Unspecified parameter or variable in size, as determined by design.



**Figure 7-17 Bottom Thermal Plane Termination**

**7.5.16 Components with Bottom Thermal Plane Terminations (D-Pak)** The thermal transfer plane acceptance criteria are design and process related. Issues to consider include but are not limited to solder coverage, voids, solder height, component supplier’s application notes, etc. When soldering these types of components, voiding in the thermal plane is common.

The mounting and solder requirements for SMT terminations shall [D1D2D3] meet the criteria for the type of lead termination being used.

Connections formed to components with bottom thermal plane terminations, see Figure 7-17, shall [D1D2D3] meet the dimensional and solder fillet requirements of Table 7-19.

**Table 7-19 Dimensional Criteria – Bottom Thermal Plane Terminations**

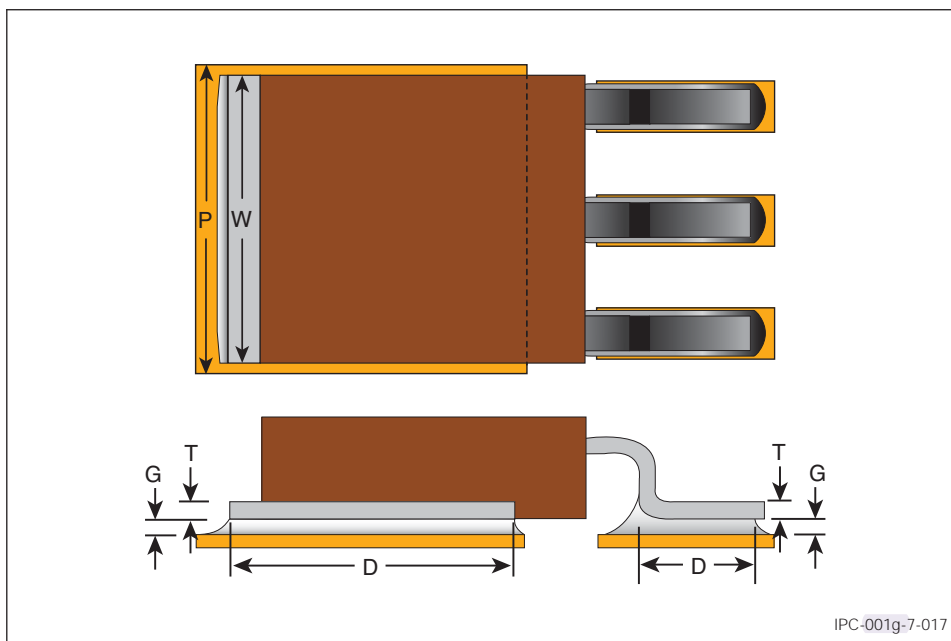
Feature (all connections except thermal plane)	Dim.	Criteria for the type of lead termination being used.
Maximum Side Overhang	A	
Toe Overhang	B	
Minimum End Joint Width, Note 4	C	
Minimum Side Joint Length	D	
Maximum Heel Fillet Height	E	
Minimum Heel Fillet Height	F	
Solder Fillet Thickness	G	
Lead Thickness	T	
Feature (only for the thermal plane connection)		Class 1,2,3
Thermal Plane Side Overhang		Not greater than 25% of termination width.
Thermal Plane End Overhang		No overhang.
Thermal Plane End Joint Width, Notes 2 and 4		100% wetting to land in the end-joint contact area.
Thermal Plane Side Joint Length	D	Note 1
Thermal Plane Solder Fillet Thickness	G	Wetting is evident when a fillet is present.
Thermal Plane Void Criteria		Note 1
Thermal Plane Termination Width	W	Note 3
Thermal Plane Land Width	P	Note 3

**Note 1:** Acceptance criteria will need to be established between the Manufacturer and User.

**Note 2:** Solder wetting is not required on trimmed edges of a thermal plane that expose non-wettable vertical surfaces.

**Note 3:** Unspecified parameter or variable in size, determined by design.

**Note 4:** (C) is measured at the narrowest point of the required fillet.



**Figure 7-17 Bottom Thermal Plane Termination**



**7.5.17 Flattened Post Connections** This termination style is sometimes referred to as nail-head pin.

Criteria have not been established for Class 3 for this termination style. Process development and control is essential for continued success of assembly methods.

Connections formed to components with flattened post connections (Figure 7-18) shall [D1D2N3] meet the dimensional and solder fillet requirements of Table 7-20.

**Table 7-20 Dimensional Criteria Flattened Post Connections**

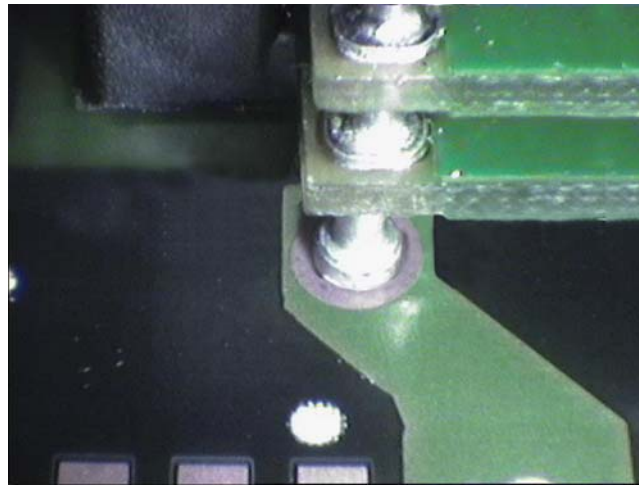
Feature	Class 1	Class 2	Class 3
Maximum Termination Overhang, Square Solder Land	75% Termination Width (W), Notes 1, 2	50% Termination Width (W), Notes 1, 2	Criteria not established
Maximum Termination Overhang, Round Solder Land	50% Termination Width (W), Notes 1, 2	25% Termination Width (W), Notes 1, 2	
Maximum Fillet Height	Note 4		
Minimum Fillet Height	Note 3		

**Note 1:** Does not violate minimum electrical clearance.

**Note 2:** Lead diameter is less than diameter or side length of the solder land.

**Note 3:** Wetting is evident.

**Note 4:** Solder does not touch component body.



**Figure 7-18 Flattened Post Termination**

**7.5.17 Flattened Post Connections** This termination style is sometimes referred to as nail-head pin.

Criteria have not been established for Class 3 for this termination style. Process development and control is essential for continued success of assembly methods.

Connections formed to components with flattened post connections, see Figure 7-18, shall [D1D2N3] meet the dimensional and solder fillet requirements of Table 7-20.

**Table 7-20 Dimensional Criteria Flattened Post Connections**

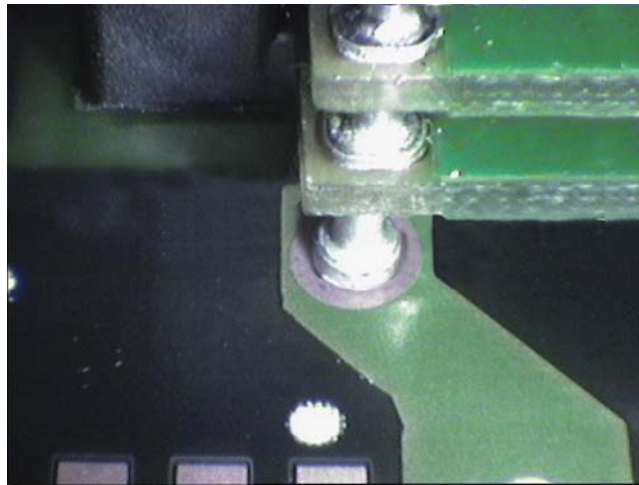
Feature	Class 1	Class 2	Class 3
Maximum Termination Overhang, Square Solder Land	75% Termination Width (W), Notes 1, 2	50% Termination Width (W), Notes 1, 2	Criteria not established
Maximum Termination Overhang, Round Solder Land	50% Termination Width (W), Notes 1, 2	25% Termination Width (W), Notes 1, 2	
Maximum Fillet Height	Note 4		
Minimum Fillet Height	Note 3		

**Note 1:** Does not violate minimum electrical clearance.

**Note 2:** Lead diameter is less than diameter or side length of the solder land.

**Note 3:** Wetting is evident.

**Note 4:** Solder does not touch component body.



**Figure 7-18 Flattened Post Termination**

**7.5.18 P-Style Terminations** Connections formed to components having the P-Style termination (Figure 7-19) shall [D1D2D3] meet the dimensional and solder fillet requirements of Table 7-21. This termination style is typically found on edge mounted connectors that will be soldered on both sides of the board.

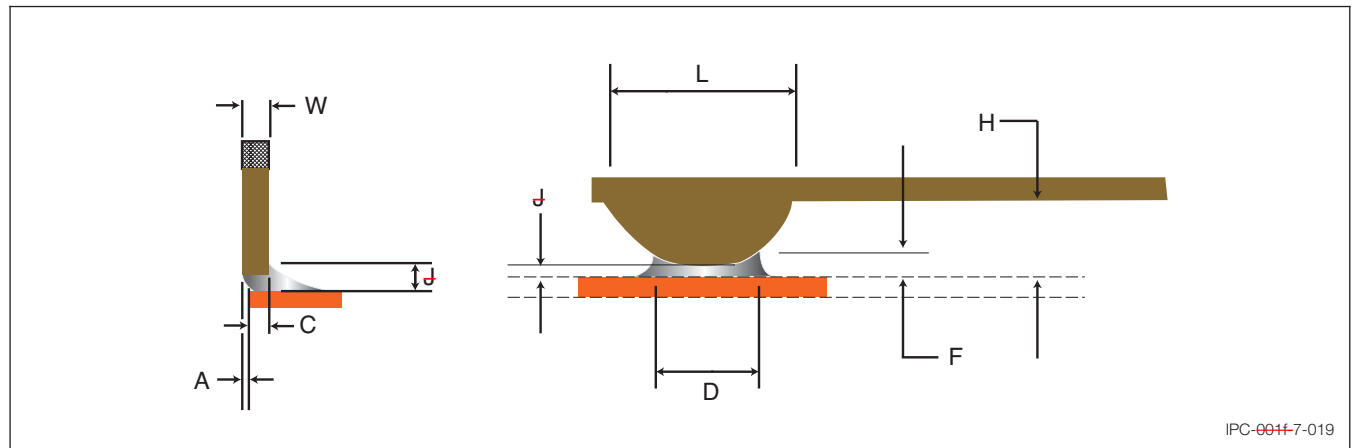
**Table 7-21 Dimensional Criteria – P-Style Terminations**

Feature	Dim.	Class 1	Class 2	Class 3
Maximum Side Overhang	A	50% (W)	25% (W)	Not permitted
Maximum Toe Overhang	B	Note 1		
Minimum End Joint Width	C	50% (W)	75% (W)	100% (W)
Minimum Side Joint Length	D	100% (W)	150% (W)	
Minimum Fillet Height – Heel and Toe	F	Note 2	25% (H)	
Termination Height	H	Note 3		
Minimum Side Fillet Height	J	Note 2		
Termination Length	L	Note 3		
Termination Width	W	Note 3		

**Note 1:** No part of the “L” portion of the termination extends beyond the land.

**Note 2:** Wetting is evident.

**Note 3:** Unspecified parameter or variable in size, determined by design.



**Figure 7-19 P-Style Termination**

**7.6 Specialized SMT Terminations** The IPC committee that maintains this standard has received requests to include a number of specialized SMT termination styles. Often these termination styles are unique to a particular component or are specially made for a limited number of users. Before acceptance criteria can be developed there needs to be significant use so that a history of failure data can be captured from multiple users. Clause 1.13.2 of this standard is repeated here.

**1.13.2 Procedures for Specialized Technologies** As an industry consensus standard, this document cannot address all of the possible components and product design combinations, e.g., magnetic windings, high frequency, high voltage. Where uncommon or specialized technologies are used, it may be necessary to develop unique process and/or acceptance criteria. Often, unique definition is necessary to consider the specialized characteristics while considering product performance criteria.

The development should include User involvement. Mounting and soldering requirements for specialized processes and/or technologies not specified herein shall [N1D2D3] be performed in accordance with documented procedures which are available for review.

Whenever possible these criteria should be submitted to the IPC Technical Committee to be considered for inclusion in upcoming revisions of this standard.

**7.5.18 P-Style Terminations** Connections formed to components having the P-Style termination, see Figure 7-19, shall [D1D2D3] meet the dimensional and solder fillet requirements of Table 7-21. This termination style is typically found on edge mounted connectors that will be soldered on both sides of the board.

**Table 7-21 Dimensional Criteria – P-Style Terminations**

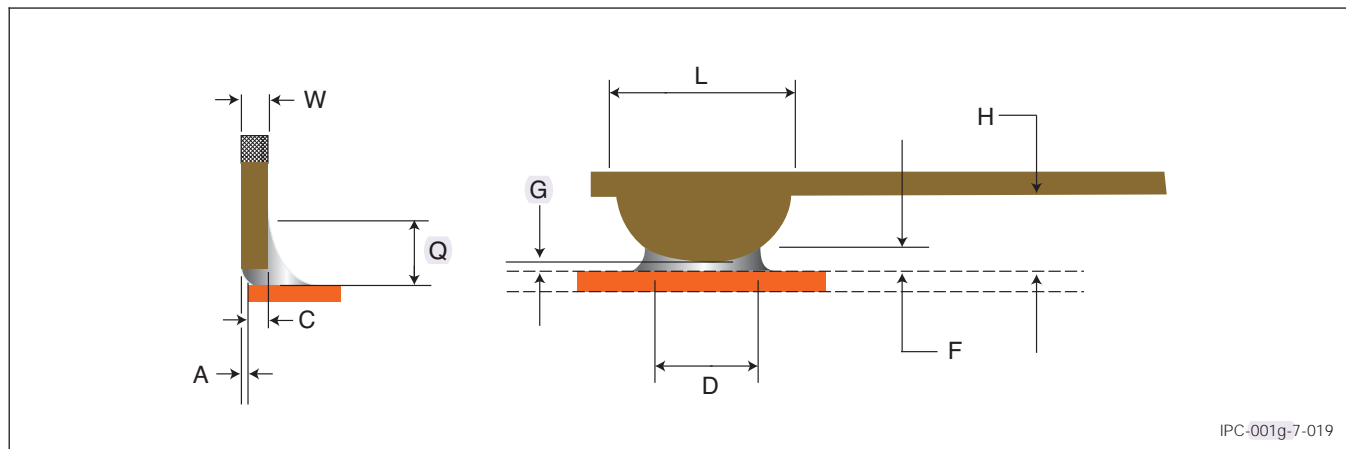
Feature	Dim.	Class 1	Class 2	Class 3
Maximum Side Overhang	A	50% (W)	25% (W)	Not permitted
Maximum Toe Overhang	B	Note 1		
Minimum End Joint Width	C	50% (W), Note 4	75% (W), Note 4	100% (W), Note 4
Minimum Side Joint Length	D	100% (W)	150% (W)	
Minimum Fillet Height – Heel and Toe	F	Note 2	25% (H)	
Solder Fillet Thickness	G	Note 3		
Termination Height	H	Note 2		
Minimum Side Fillet Height	Q	Note 3		
Termination Length	L	Note 2		
Termination Width	W	Note 2		

**Note 1:** No part of the “L” portion of the termination extends beyond the land.

**Note 2:** Unspecified parameter or variable in size, determined by design.

**Note 3:** Wetting is evident.

**Note 4:** (C) is measured at the narrowest point of the required fillet.



**Figure 7-19 P-Style Termination**

**7.6 Specialized SMT Terminations** The IPC committee that maintains this Standard has received requests to include a number of specialized SMT termination styles. Often these termination styles are unique to a particular component or are specially made for a limited number of users. Before acceptance criteria can be developed there needs to be significant use so that a history of failure data can be captured from multiple users. Clause 1.13.2 of this Standard is repeated here.

**1.13.2 Procedures for Specialized Technologies** *As an industry consensus standard, this document cannot address all of the possible components and product design combinations, e.g., magnetic windings, high frequency, high voltage. Where uncommon or specialized technologies are used, it may be necessary to develop unique process and/or acceptance criteria. Often, unique definition is necessary to consider the specialized characteristics while considering product performance criteria.*

*The development should include User involvement. Mounting and soldering requirements for specialized processes and/or technologies not specified herein shall [N1D2D3] be performed in accordance with documented procedures which are available for review.*

*Whenever possible these criteria should be submitted to the IPC Technical Committee to be considered for inclusion in upcoming revisions of this Standard.*