

JEDEC DESIGN STANDARD

DESIGN REQUIREMENTS FOR OUTLINES OF SOLID STATE AND RELATED PRODUCTS

JEDEC PUBLICATION 95

DESIGN GUIDE 4.19

QUAD NO-LEAD STAGGERED AND INLINE MULTI-ROW PACKAGES (WITH OPTIONAL THERMAL ENHANCEMENTS) (QFN)

**JEDEC
SOLID STATE TECHNOLOGY ASSOCIATION**

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PLASTIC QUAD NO-LEAD
STAGGERED MULTI-ROW PACKAGES
(WITH OPTIONAL THERMAL ENHANCEMENTS)

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4.19 PLASTIC QUAD NO-LEAD STAGGERED AND INLINE MULTI-ROW PACKAGES WITH
OPTIONAL THERMAL ENHANCEMENTS (QFN)

This Design Guide applies to packages with optional thermal enhancements as well as various height profiles and pitches. Therefore, the “HP”, “F”, and “(T, V, W, X, U)” prefixes will not be referenced unless the detail in question pertains only to a specific variation. Refer to JESD-30 for formal package designators.

4.19-1 ILLUSTRATION

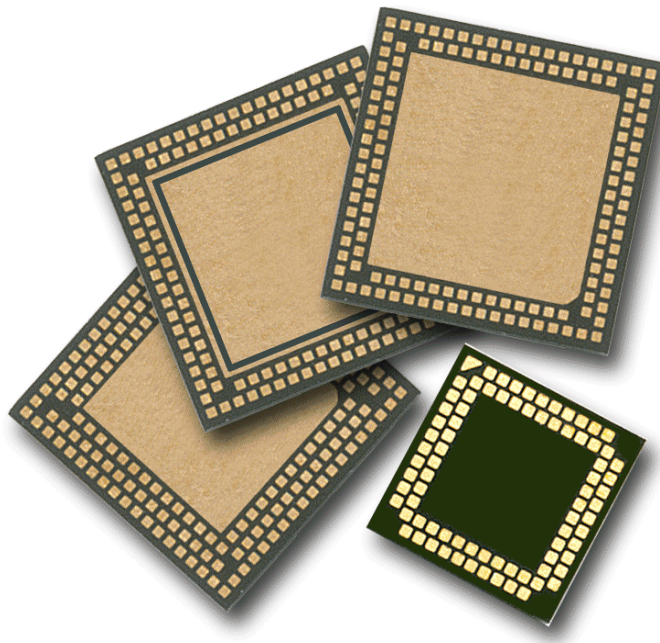


FIGURE 4.19-1

PLASTIC QUAD NO-LEAD STAGGERED AND IN LINE MULTI-ROW PACKAGES
WITH OPTIONAL THERMAL ENHANCEMENTS

4.19-2 PACKAGE DESCRIPTION

Plastic Quad No-Lead Staggered and In line Multi-row Packages (QFN) are plastic semiconductor packages with metallized terminals located along the edges of the bottom surface of the package body arranged in 2 or 3 rows.

By design the package terminals are flush with the bottom surface of the plastic package body, so the packages are considered to be “leadless” or “no-lead”.

This package has 2 rows or 3 rows of terminals on all four edges of the bottom surface of the package. The package can have a square or a rectangular body as well as symmetric or asymmetric terminal patterns.

4.19-3 CONCEPT

This design guide defines the symbology, algorithms, dimensions and tolerances for multi-row QFN packages. The guidelines are based on metric dimensions and adhere to the geometric dimensioning and tolerancing principles defined in ASME Y14.5M-1994.

4.19-4 RECOMMENDED PACKAGE OUTLINE

Refer to Table 4.19-1 and Figures 4.19-2 through 4.19-12 for the recommended symbology and outline format for multi-row QFN packages.

4.19-5 RECOMMENDED VALUES AND TOLERANCES

The following table defines the symbology and recommended algorithms, dimensions and tolerances that shall be used when preparing a multi-row QFN outline.

**Table 4.19-1 — Symbols, Recommended Values and Tolerances
(Values in mm)**

SYMBOL	DEFINITION	eT	MIN	NOM	MAX	NOTES
A	Overall component height measured from the seating plane (Datum C). Both A minimum and A maximum must be specified.	All	-	-	-	Refer to JEDEC's Publication 95, Section 4.3, and SPP-017 for height profiles. (T, V, W or U recommended).
A1	The vertical distance from the bottom surface of the plastic body to the nearest metallized package feature.	All	0.00	-	0.05	(Protrusion of the metallized terminal or exposed heat feature from the plastic body.) Figure 4.19-2.
			0.03	-	0.13	For bumped and pillar terminals only.
b	The width of the metallized terminals (including lead finish) exposed at the bottom surface of the package.	0.65	0.35	-	0.45	
		0.50	0.20 0.25	-	0.30 0.35	
		0.40	0.15	-	0.25	
D	The package body dimension in the horizontal direction.	All	Basic Dimension - "D" to be in increments of 0.50 mm ranging from 4 mm to 19 mm			JEDEC may recommend D>19 mm once proven manufacturable.
D2	The horizontal dimension of the exposed metal heat feature.	All	0.0	D2max must not violate the minimum metal separation requirement (k)		Minimum value of zero applies to products built without a heat feature.
D3	The horizontal dimension of the floating ring.	All	0.0	D2max must not violate the minimum metal separation requirement (k)		Minimum value of zero applies to products built without a floating ring.
d	The width of the floating ring.	All	0.30 nom.			
E	The package body dimension in the vertical direction.	All	Basic Dimension - "E" to be in increments of 0.50 mm ranging from 4 mm to 19 mm			JEDEC may recommend D>19 mm once proven manufacturable.
E2	The vertical dimension of the exposed metal heat feature.	All	0.0	E2max must not violate the minimum metal separation requirement (k)		Minimum value of zero applies to products built without a heat feature.
E3	The vertical dimension of the floating ring.	All	0.0	E2max must not violate the minimum metal separation requirement (k)		Minimum value of zero applies to products built without a floating ring.
H1	Saw-isolated trench width	All	0.20 min			Figure 4.19.8
H2	Saw-isolated trench depth	All	0.25 max			Figure 4.19.8