

JEDEC DESIGN GUIDE

DESIGN REQUIREMENTS FOR OUTLINES OF SOLID STATE AND RELATED PRODUCTS

JEDEC PUBLICATION 95

DESIGN GUIDE 4.24

SCALABLE QUAD FLAT NO-LEAD PACKAGES, SQUARE AND RECTANGULAR (SCALABLE QFN)



JEDEC SOLID STATE TECHNOLOGY ASSOCIATION

Date: August 2016
Item: 11.2-895S
Copyright © 2016 JEDEC

Issue: B

SCALABLE QFN PACKAGE, SQUARE AND RECTANGULAR

CONTENTS

Sections	Pages
4.24 Scalable QFN package	4.24-2
4.24.1 Illustrations	4.24-2
4.24.2 Package Description	4.24-3
4.24.3 Concept	4.24-3
4.24.4 Design Requirements	4.24-3
4.24.5 Recommended Values and Tolerances	4.24-5
4.24.6 Notes	4.24-13
Change Record	4.24-14
 Figures	
4.24-1 Top And Bottom Views Of A Scalable QFN Package	4.24-2
4.24-2 Scalable QFN Detailed Top, Side And Bottom Views	4.24-10
4.24-3 Thermal Land Pattern Dimensions	4.24-11
4.24-4 Details C and D: Terminal Dimensions	4.24-11
4.24-5 Section A-A: Terminal and Thermal land Details with SMD, NSMD and Mixture of SMD and NSMD Options	4.24-12
 Tables	
4.24-1 Symbols, Recommended Values and Tolerances	4.24-5

4.24 SCALABLE QFN PACKAGE

This design standard applies to packages with a fixed number of terminals, various height profiles and terminal pitches. Therefore, the prefixes will not be referenced unless the detail in questions pertains only to a specific variation. (Refer to JESD-30 for formal nomenclature.)

4.24.1 Illustrations

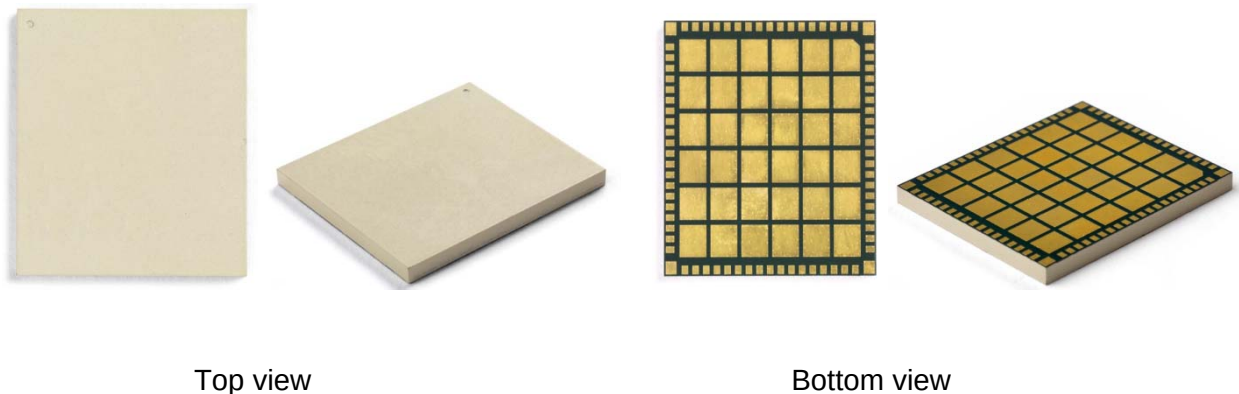


FIGURE 4.24-1 TOP AND BOTTOM VIEWS OF A SCALABLE QFN PACKAGE

4.24.2 Package Description

A “Scalable” Quad Flat No-Lead (QFN) package has a fixed number of peripheral terminals with a segmented metallized heat center pad on the bottom surface. Scaling within the package family is allowed for the various features: body size, terminal pitch, terminal size, and the number and size of segments in the heat pad region. The terminal pitches and sizes vary based on the body size. The carrier body of the package has a metal circuit pattern applied to a dielectric structure. Consequently, these packages are categorized as “leadless” or “no-lead”. These terminals form the mechanical and electrical connections from the package body to a mating feature such as printed circuit board. The surface that contains the semiconductor devices may be encapsulated by various techniques to protect the included devices. The scalable QFN packages have terminals on all four edges of the bottom surface of the package. These scalable QFN Packages can have a square or a rectangular body with symmetric terminal patterns. (See figure 4.24-1 for an example of a scalable QFN package with a rectangular body).

4.24.3 Concept

This design guide defines the symbols, algorithms, and recommended dimensions and tolerances for a family of scalable QFN Packages. The guidelines are based on hard metric dimensions and adhere to the geometric dimensioning and tolerancing principles defined in ASME Y14.5M-1994.

Body size dimensions D and E are determined in relationship to the Terminal #1 index area. The position of the terminal 1 is in the upper left corner of the package as viewed from the plastic surface. D should then be measured in the horizontal direction. Similarly, E is measured in the vertical direction. (See figure 4.24 -2)

For official Descriptive Designators, see JEDEC Standard JESD30.

4.24.4 Design Requirements

4.24.4.1 Body Size

The D and E dimensions define the body size for a scalable QFN package. Dimension D is the size of the body measured parallel to the minor axis of the package and dimension E is the size measured parallel to the major axis.

4.24.4.2 Terminals Description

The Scalable QFN has a fixed number of peripheral (I/O) terminals based on its body shape. The square body sizes have 68 I/O terminals, while the rectangular ones have 74 I/O terminals. The terminal size, location and pitch vary based on the body size.

The terminals are allowed to be Solder Mask Defined (SMD), Non-Solder Mask Defined (NSMD) or a mixture of both constructions. (See Figure 4.24-5). The package performance is electrically and thermally enhanced by the metallized ground pad which is centrally located on the bottom surface of the package. The center ground pad area can be segmented into a matrix array of smaller metallized pads. These metallized pads can be electrically connected to each other or separated by non-electrically conductive materials (epoxy, solder mask, FR4, etc.).

4.24.4.3 Seating Plane

The plane formed by the three terminal apexes that exhibit the greatest perpendicular distance from the package substrate, provided that the triangle formed by those three apexes encompasses the projection of the Center Of Gravity (COG) of the component. This surface becomes the basis for all measurements with respect to Datum C (See Figure 4.24-2).

4.24.4.4 Profile Height

The profile height, A, of a scalable QFN package is the distance from the seating plane to the highest point on the package body. This distance is measured perpendicular to the seating plane (Refer to JESD30).