



Application note 5 for the 2008 IC Cost Model – March 26, 2008

Packaging Cost Calculations

Introduction

In this applications note we will discuss the different package types supported in the 2008 IC Cost Model and how to go about calculating packaging costs.

Supported packages

The supported packages with a description of the packages are:

1. Bumped die – used for bumped die sold as bare die.
2. Bumped die with coating – used for bumped die with a protective coating sold as bare die.
3. cBGA – ceramic Ball Grid Array
4. cLGA – ceramic Land Grid Array
5. cPGA – ceramic Pin Grid Array
6. DIP – Dual In-Line Package (plastic)
7. fcBGA – flip chip Ball Grid Array
8. fcLGA – flip chip Land Grid Array
9. fcPGA – flip chip Pin Grid Array
10. LQFP – Low Quad Flat Pack (1.4mm body thickness)
11. MLF/MLP – MicroLeadFrame/MicroLeadPackage also known as a QFN.
12. MQFP – Metric Quad Flat Pack (2.0 to 3.8mm body thickness)
13. pBGA – plastic Ball Grid Array
14. pPGA – plastic Pin Grid Array
15. PLCC – Plastic Leaded Chip Carrier
16. SOIC – Small Outline Integrated Circuit
17. SOJ – Small Outline J Lead
18. TQFP – Thin Quad Flat Pack (1.0mm body thickness)
19. TSOP – Thin Small Outline Package

Package variants

- Lead Pitch - we get a lot of questions about lead pitch and the effect of smaller lead pitch on cost. Our model currently assumes a similar cost for all lead pitches. For example a fine pitch or regular plastic BGA would both use the pBGA setting.
- Lead free and ROHS are common requirements now and have no cost adder.
- Layers - BGA, LGA and PGA packages have substrate layers. Ceramic and Flip Chip variants assume 6 layers by default; plastic variants assume 2 layers by

default. The number of layers may be changed by selecting a number in the dropdown list in cell D44 on the '4 Defaults' page.

- Packaging Source – the drop down in cell D45 on the '4 Defaults' page allows out-sourced or in-house packaging to be selected. Out-sourced is the default and includes a 20% margin. Selecting in-house reduces packaging costs by 20%.
- Backgrind – cell D46 on the '4 Defaults' page allows backgrind yes or no to be selected. The default values for this setting fill in automatically depending on package type but by changing the cell D46 setting the default may be overridden.
- Exposed heat pad/slug may be selected using the dropdown in cell D47 on the '4 Defaults' page.