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## CHAPTER 1 PACKAGE DESIGN

Package Codes

Product Date Codes

Flammability Rating

Oxygen Index

Ball Grid Array

Land Grid Array

Leadframe

## PACKAGE CODES

The following two tables—“*Package Codes for Spansion Memory Products*” and “*Die and Wafer Package Codes for Spansion Memory Products*”—provide the definitions of the internal package codes for each package design, the data being grouped by package family type.

### Package Codes for Spansion Memory Products

Package Code	Description
Ball Grid Array (BGA)	
ALD	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 12.00 mm x 12.00 mm body size, 1.1 mm maximum height
ALF	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 12.00 mm x 12.00 mm body size, 1.05 mm maximum height
ALG	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 12.00 mm x 12.00 mm body size, 1.1 mm maximum height
ALH	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 15.00 mm x 15.00 mm body size, 1.1 mm maximum height
ALJ	Fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 12.0 mm x 12.0 mm body size, 1.15 mm maximum height
ALK	Fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 13.0 mm x 11.5 mm body size, 1.2 mm maximum height
AMA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 15.00 mm x 15.00 mm body size, 1.2 mm maximum height
AMB	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 12.00 mm x 12.00 mm body size, 1.15 mm maximum height
ASA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 11.00 mm x 8.00 mm body size, 1.2 mm maximum height
ASB	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 12.00 mm x 12.00 mm body size, 1.2 mm maximum height
ASC	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 12.00 mm x 12.00 mm body size, 1.1 mm maximum height
ASD	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 13.00 mm x 8.00 mm body size, 1.2 mm maximum height
ASE	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 15.00 mm x 15.00 mm body size, 1.1 mm maximum height
ASF	Fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 12.00 mm x 12.00 mm body size, 1.15 mm maximum height
ASH	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 11.00 mm x 9.00 mm body size, 1.2 mm maximum height
ATA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 15.00 mm x 15.00 mm body size, 1.2 mm maximum height
BEA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 13.00 mm x 8.00 mm body size, 1.4 mm maximum height
BFA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 13.00 mm x 9.00 mm body size, 1.4 mm maximum height
BNA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 13.00 mm x 11.50 mm body size, 1.4 mm maximum height
BNB	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 13.00 mm x 9 mm body size, 1.4 mm maximum height
BTA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 15.00 mm x 15.00 mm body size, 1.25 mm maximum height

**Package Codes for Spansion Memory Products (Continued)**

Package Code	Description
BWA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 14 mm x 14 mm body size, 1.7 mm maximum height
BWB	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch; 15 mm x 15 mm body size, 1.3 mm maximum height
FAA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 13 mm x 10 mm body size, 1.2 mm maximum height
FAB	Thin profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 8 mm x 6 mm body size, 1.2 mm maximum height
FAC	Thin profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 8 mm x 6 mm body size, 1.2 mm maximum height
FBA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 8.15 mm x 6.15 mm body size, 1.2 mm maximum height
FBB	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 9.00 mm x 6.0 mm body size, 1.2 mm maximum height
FBC	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 9.00 mm x 8.00 mm body size, 1.2 mm maximum height
FBD	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 14.00 mm x 8.00 mm body size or 12.00 mm x 6.0 mm body size, 1.2 mm maximum height
FBE	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 15.00 mm x 8.0 mm body size or 12.00 mm x 11.00 mm body size, 1.2 mm maximum height
FBF	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals 0.5 mm pitch; 9.2 mm x 8 mm body size, 1.2 mm maximum height
FDD	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals 0.5 mm pitch; 10 mm x 7 mm body size, 1.2 mm maximum height
FDE	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals 0.5 mm pitch; 10 mm x 11 mm body size, 1.2 mm maximum height
FEA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12 mm x 9 mm body size, 1.4 mm maximum height
FEB	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.6 mm x 8 mm body size, 1.4 mm maximum height
FEC	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 11 mm x 8 mm body size, 1.3 mm maximum height
FED	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals 0.8 mm pitch; 12 mm x 9 mm body size, 1.4 mm maximum height, minimum ball height 0.21 mm
FEE	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 11 mm x 8 mm body size, 1.4 mm maximum height
FEF	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 11 mm x 9 mm body size, 1.4 mm maximum height
FFA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12 mm x 9 mm body size, 1.4 mm maximum height
FFB	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.6 mm x 8 mm body size, 1.4 mm maximum height
FFC	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13.0 mm x 9 mm body size, 1.55 mm maximum height
FFD	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13.0 mm x 9 mm body size, 1.55 mm maximum height
FIA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12 mm x 9 mm body size, 1.4 mm maximum height

**Package Codes for Spansion Memory Products (Continued)**

Package Code	Description
FIB	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 11 mm body size, 1.6 mm maximum height
FJA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 11 mm body size, 1.6 mm maximum height
FLA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11 mm x 8 mm body size, 1.4 mm maximum height
FLB	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.6 mm x 8 mm body size, 1.4 mm maximum height
FLG	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11 mm x 9 mm body size, 1.4 mm maximum height
FLJ	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.6 mm x 8 mm body size, 1.4 mm maximum height
FLK	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 9 mm body size, 1.4 mm maximum height
FMB	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals, 0.8 mm pitch; 13 mm x 9 mm body size, 1.4 mm maximum height
FMC	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals, 0.8 mm pitch; 12 mm x 9 mm body size, 1.4 mm maximum height
FMD	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals, 0.8 mm pitch; 11.6 mm x 8 mm body size, 1.4 mm maximum height
FME	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals, 0.8 mm pitch; 11 mm x 9 mm body size, 1.4 mm maximum height
FMI	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals, 0.8 mm pitch; 13 mm x 11 mm body size, 1.4 mm maximum height
FND	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 11 mm body size, 1.4 mm maximum height
FOA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12 mm x 9 mm body size, 1.55 mm maximum height
FPB	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 9 mm body size, 1.55 mm maximum height
FSA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12 mm x 11 mm body size, 1.7 mm maximum height
FSB	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.6 mm x 8 mm body size, 1.55 mm maximum height
FSC	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals, 0.8 mm pitch; 11.6 mm x 8 mm body size, 1.4 mm maximum height
FSD	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals, 0.8 mm pitch; 11.95 mm x 10.95 mm body size, 1.4 mm maximum height
FTA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.6 mm x 8 mm body size, 1.4 mm maximum height
FTD	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.5 mm x 9 mm body size, 1.4 mm maximum height
FTE	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 9 mm body size, 1.4 mm maximum height
FTF	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12 mm x 9 mm body size, 1.4 mm maximum height
FTG	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12 mm x 9 mm body size, 1.4 mm maximum height

**Package Codes for Spansion Memory Products (Continued)**

Package Code	Description
FTI	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12 mm x 9 mm body size, 1.4 mm maximum height
FTJ	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11 mm x 9 mm body size, 1.4 mm maximum height
FTK	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 10.5 mm body size, 1.4 mm maximum height
FTL	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 9.0 mm body size, 1.4 mm maximum height
FTM	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 11.0 mm body size, 1.4 mm maximum height
FUB	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12 mm x 9 mm body size, 1.4 mm maximum height
FVC	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13.0 mm x 9.0 mm body size, 1.6 mm maximum height
FVE	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 11 mm body size, 1.55 mm maximum height
FWA	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12 mm x 9 mm body size, 1.4 mm maximum height
FWC	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 11 mm body size, 1.4 mm maximum height
FWD	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13 mm x 11 mm body size, 1.4 mm maximum height
LAA	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 13 mm x 11 mm body size, 1.4 mm maximum height
LAB	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 15 mm x 10 mm body size, 1.4 mm maximum height
LAC	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 12 mm x 18 mm body size, 1.4 mm maximum height
LAD	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 11 mm x 9 mm body size, 1.4 mm maximum height
LAE	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 9.0 mm x 9.0 mm body size, 1.4 mm maximum height
LIA	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 13 mm x 11 mm body size, 1.6 mm maximum height
LSA	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 13 mm x 11 mm body size, 1.7 mm maximum height
LSB	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 13 mm x 11 mm body size, 1.6 mm maximum height
LSC	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 18 mm x 12 mm body size, 1.6 mm maximum height
LSE	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 13 mm x 11 mm body size, 1.4 mm maximum height
LSF	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 13 mm x 11 mm body size, 1.6 mm maximum height
LSG	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 13 mm x 11 mm body size, 1.4 mm maximum height
LSH	Low profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 13 mm x 11 mm body size, 1.4 mm maximum height

**Package Codes for Spansion Memory Products (Continued)**

Package Code	Description
MMB	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 13.0 mm x 11.0 mm body size, 1.4 mm maximum height
MTA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 11.0 mm x 10.0 mm body size, 1.3 mm maximum height
NLA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 10.95 mm x 9.95 mm body size, 1.2 mm maximum height
NLB	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 8.0 mm x 9.2 mm body size, 1.2 mm maximum height
NLC	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 11 mm x 10 mm body size, 1.2 mm maximum height
NLD	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 7.7 mm x 6.2 mm body size, 1.2 mm maximum height
NLE	Low profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 8.00 mm x 8.00 mm body size, 1.1 mm maximum height
NSA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 10.95 mm x 9.95 mm body size, 1.2 mm maximum height
NSB	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 9.2 mm x 8.0 mm body size, 1.2 mm maximum height
NSC	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 8.0 mm x 8.0 mm body size, 1.1 mm maximum height
NSD	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 7.7 mm x 6.2 mm body size, 1.2 mm maximum height
NSE	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 10.0 mm x 8.0 mm body size, 1.2 mm maximum height
PIA	Ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 18 mm x 14 mm body size, 1.8 mm maximum height
PNA	Ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 18 mm x 14 mm body size, 1.8 mm maximum height
RLA	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 7.7 mm x 6.2 mm body size, 1.0 mm maximum height
RLB	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 8.0 mm x 8.0 mm body size, 1.0 mm maximum height
RLD	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 11.0 mm x 10.0 mm body size, 1.0 mm maximum height
RLE	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 11.0 mm x 10.0 mm body size, 1.0 mm maximum height
RLF	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 7.5 mm x 5.0 mm body size, 1.0 mm maximum height
RLG	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 6.0 mm x 5.0 mm body size, 1.0 mm maximum height
RSB	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 7.5 mm x 5.0 mm body size, 1.0 mm maximum height
RSC	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 8.0 mm x 8.0 mm body size, 1.0 mm maximum height
RSD	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 7.7 mm x 6.2 mm body size, 1.0 mm maximum height
RSE	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 6.0 mm x 5.0 mm body size, 1.0 mm maximum height



### Package Codes for Spansion Memory Products (Continued)

Package Code	Description
TLA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 11.6 mm x 8 mm body size, 1.2 mm maximum height
TLB	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 10.0 mm x 8.0 mm body size, 1.2 mm maximum height
TLC	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.6 mm x 8.0 mm body size, 1.2 mm maximum height
TLD	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12.0 mm x 9.0 mm body size, 1.2 mm maximum height
TLE	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.0 mm x 8.0 mm body size, 1.2 mm maximum height
TLF	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 8.15 mm x 6.15 mm body size, 1.2 mm maximum height
TLH	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13.0 mm x 10.5 mm body size, 1.2 mm maximum height
TLI	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.0 mm x 9.0 mm body size, 1.2 mm maximum height
TLJ	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 10.0 mm x 10.0 mm body size, 1.2 mm maximum height
TLK	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13.0 mm x 11.0 mm body size, 1.2 mm maximum height
TLM	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.5 mm x 9.0 mm body size, 1.2 mm maximum height
TMA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12.00 mm x 9.00 mm body size, 1.2 mm maximum height
TMB	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13.00 mm x 11.00 mm body size, 1.2 mm maximum height
TSA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.0 mm x 8.0 mm body size, 1.2 mm maximum height
TSB	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.6 mm x 8.0 mm body size, 1.2 mm maximum height
TSC	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 9.0 mm x 7.0 mm body size, 1.2 mm maximum height
TSD	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 12.0 mm x 9.0 mm body size, 1.2 mm maximum height
TSE	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 10.0 mm x 8.0 mm body size, 1.2 mm maximum height
TSF	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13.0 mm x 10.5 mm body size, 1.2 mm maximum height
TSG	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.0 mm x 9.0 mm body size, 1.2 mm maximum height
TSH	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.5 mm x 9.0 mm body size, 1.2 mm maximum height
TTA	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 11.6 mm x 8.0 mm body size, 1.2 mm maximum height
T3A	Thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 13.0 mm x 11.0 mm body size, 1.2 mm maximum height
UDA	Ultra thin fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.50 mm pitch; 6.0 mm x 5.00 mm body size, 0.52 mm maximum height



### Package Codes for Spansion Memory Products (Continued)

Package Code	Description
VBB	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals (80 ball); 11.50 mm x 9.00 mm package body size, 1.0 mm maximum height, 0.8 mm pitch
VBC	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 11.95 mm x 10.95 mm package body size, 1.0 mm maximum height, 0.8 mm pitch
VBD	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 8.95 mm x 7.95 mm package body size, 1.0 mm maximum height, 0.8 mm pitch
VBE	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 11.95 mm x 9.65 mm package body size, 1.0 mm maximum height, 0.8 mm pitch
VBF	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 8.15 mm x 6.15 mm package body size, 1.0 mm maximum height, 0.8 mm pitch
VBG	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 11 mm x 8 mm body size, 1.0 mm maximum height
VBH	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 11.6 mm x 8 mm body size, 1.0 mm maximum height
VBJ	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 8.95 mm x 7.95 mm body size, 1.0 mm maximum height
VBK	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 8.15 mm x 6.15 mm body size, 1.0 mm maximum height
VBL	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 11 mm x 8 mm body size, 1.0 mm maximum height
VBM	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 11 mm x 9 mm body size, 1.0 mm maximum height
VBN	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 10 mm x 6 mm body size, 1.0 mm maximum height
VBP	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 13 mm x 11 mm x 1.0 mm body size, 14 mm x 10 mm ball matrix, 1.0 mm maximum height
VBR	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 9 mm x 7 mm x body size, 1.0 mm maximum height
VBS	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 11.95 mm x 9.65 mm x body size, 1.0 mm maximum height
VBU	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 9 mm x 7 mm body size, 1.0 mm maximum height
VBV	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 10.0 mm x 10.0 mm body size, 1.0 mm maximum height
VBW	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 10.0 mm x 8.0 mm body size, 1.0 mm maximum height
VBY	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 12.0 mm x 12.0 mm body size, 1.0 mm maximum height
VCD	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.75 mm pitch, 9.00 mm x 7.70 mm body size, 1.0 mm maximum height
VCA	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.75 mm pitch, 9.3 mm x 7.70 mm package body size, 1.0 mm maximum height
VCB	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.75 mm pitch, 7.8 mm x 9.0 mm package body size, 1.0 mm maximum height
VCC	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 11.00 mm x 9.00 mm package body size, 1.0 mm maximum height, 9 mm x 8 mm depopulated ball matrix with 0.8 mm pitch

### Package Codes for Spansion Memory Products (Continued)

Package Code	Description
VCE	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.75 mm pitch, 9.0 mm x 7.7 mm x body size, 1.0 mm maximum height
VDA	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch; 8 mm x 9.2 mm body size, 1.0 mm maximum height
VDC	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 10.95 mm x 9.95 mm body size, 1.0 mm maximum height
VDD	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 9.2 mm x 8.0 mm body size, 1.0 mm maximum height
VDE	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 6.2 mm x 7.7 mm body size, 1.0 mm maximum height
VDF	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 6 mm x 4 mm body size, 1.0 mm maximum height
VDG	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 6 mm x 5 mm body size, 1.0 mm maximum height
VDH	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 9.2 mm x 8.0 mm body size, 1.0 mm maximum height
VDL	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 7.5 mm x 5 mm body size, 1.0 mm maximum height
VDJ	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.5 mm pitch, 7.7 mm x 6.2 mm body size, 1.0 mm maximum height
VLB	Very thin profile fine pitch rectangular ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch; 10.0 mm x 8.0 mm body size, 1.0 mm maximum height
VLD	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 11 mm x 9 mm body size, 1.0 mm maximum height
VSA	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 11.6 mm x 8.0 mm body size, 1.0 mm maximum height
VSB	Very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.8 mm pitch, 10.0 mm x 8.0 mm body size, 1.0 mm maximum height
WZA	Very, very thin profile fine pitch ball grid array; wire bondable rigid substrate; solder ball terminals; 0.65 mm pitch, 5.0 mm x 7.0 mm body size, 0.8 mm maximum height
ZSA	Thin profile ball grid array; wire bondable rigid substrate; solder ball terminals; 1.0 mm pitch; 8 mm x 6 mm body size, 1.2 mm maximum height
Land Grid Array (LGA)	
L1A	Low profile fine pitch rectangular land grid array; wire bondable rigid substrate; land terminals; 0.8 mm pitch; 29 mm x 27 mm body size, 1.7 mm maximum height
L2A	Low profile fine pitch rectangular land grid array; wire bondable rigid substrate; land terminals; 0.8 mm pitch; 29 mm x 27 mm body size, 1.7 mm maximum height
L3A	Low profile fine pitch rectangular land grid array; wire bondable rigid substrate; land terminals; 0.8 mm pitch; 29 mm x 27 mm body size, 1.7 mm maximum height
L4A	Low profile fine pitch rectangular land grid array; wire bondable rigid substrate; land terminals; 0.8 mm pitch; 29 mm x 27 mm body size, 1.7 mm maximum height
Plastic Dual-In-Line (PDIP)	
PD	Standard mil size <sup>1</sup> ; rectangular package; through-hole leads
Plastic Leaded Chip Carrier (PLCC)	
PL	Rectangular package; J-bend leads

### Package Codes for Spansion Memory Products (Continued)

Package Code	Description
Plastic Quad Flat Package (PQFP)	
PQR	Rectangular package; quad-directional, gull-wing leads
Shrink Small Outline Package (SSOP)	
SSO	Rectangular package; 5.3 mm body width
Small Outline Package (SOIC)	
SL3	300 mil body width <sup>1</sup> ; 7.5 mm x 10.3 mm body size
SO	13.30 mm body width; gull-wing leads; standard pin out
SO3	300 mil body width <sup>1</sup> ; gull-wing leads
SOA	150 mil body width <sup>1</sup> ; gull-wing leads
SOC	208 mil body width <sup>1</sup> ; gull-wing leads
SS3	300 mil body width <sup>1</sup> ; 7.5 mm x 10.3 mm body size
Thin Small Outline Package - Type 1 (leads on the two short sides of package) (TSOP)	
TS	Standard, Type I package; bi-directional, gull-wing leads; pin-out is standard
TSR	Standard, Type I package; bi-directional, gull-wing leads; pin-out is reverse
TS2	Standard, Type I package; gull-wing leads; standard pin-out
Thin Small Outline Package - Type 2 (leads on the two long sides of package) (TSOP)	
T2/T2A	Standard, Type II package; bi-directional, gull-wing leads; pin-out is standard
Ultra Thin Small Outline No Lead Package (USON)	
UNE	5 mm x 6 mm body size, 0.55 mm maximum height
Very Thin Quad Flat No Lead Package (VQFN)	
VQA	10 mm x 10 mm body size, 0.9 maximum height
Very Very Thin Small Outline No Lead Package (WSON)	
WND	5 mm x 6 mm body size, 0.8 maximum height
WNF	6 mm x 8 mm body size, 0.8 maximum height
WNG	6 mm x 8 mm body size, 0.8 maximum height
WNH	6 mm x 8 mm body size, 0.8 maximum height

Notes:

1 Mil size refers to the lead-tip to lead-tip width of the package when the leads are straightened for insertion into a board or socket.

### Die and Wafer Package Codes for Spansion Memory Products

Device Format	Package Code	Description
Die	GDE	Known good/tested die packed in embossed tape and reel
Die	GDP	Known good/tested die packed in waffle pack
Die	GDT	Known good/tested die packed in surf tape and reel
Wafer	GWJ	Known good/tested wafer packed in wafer jar

### PRODUCT DATE CODES

Every Spansion memory product manufactured is assigned a product date code that provides information so the product's manufacturing history can be traced.

Figure 1.1 shows the seal date code format for products marked prior to third quarter of 2007. The first 4 digits of the seal date code are also used for product age control and are printed on the packing label. Product age is controlled by the Spansion manufacturing enterprise system using the seal date code. Spansion continues to use the seal date code for product age control and to print on the label.

Figure 1.2 shows date code format used for Fujitsu-legacy product.

Figure 1.3 shows mark date code format for products marked from third quarter 2007 and beyond. This mark date code is used by Spansion to trace manufacturing records associated with the product. Mark date code information is available on manufacturing intermediate packing labels and shipping documents (Packing List/Certificate of Conformance).

The mark date code is primarily used for manufacturing traceability purposes. It does not specify product aging. Product aging is controlled by the Spansion manufacturing enterprise system using the seal date code and is maintained as is. Customers can refer to the seal date code printed on the packing label to see product aging.

### FLAMMABILITY RATING

The UL Rating for all Spansion products is 94 V-0. The flammability rating is determined by Underwriters Laboratories (UL) Standard 94, "Test for Flammability of Plastic Materials for Parts in Devices and Applications."

### OXYGEN INDEX

The oxygen index for all Spansion products is greater than or equal to 28%. The mold compound is tested according ASTM Standard D2863-77, "Standard Method for Measuring Oxygen Concentration to support Candle-Like Combustion of Plastics (Oxygen Index)." The weight of epoxy resin for each package is listed in the individual material data sheet found in *Chapter 2 Package Materials*.

YY WW A B C	
where:	
YY =	Last two digits of year in which product was seal/molded.
WW =	Work week in which the product was seal/molded.
A =	Alphanumeric character for the day of the week in which the product was seal/molded. ("M" designates that assembly lots have been combined).
B =	Alphanumeric character for the assembly location.
C =	Alphanumeric character for the wafer lot sequence for the day ("A" through "Z" with "M" only being used if fab lots are combined).

Figure 1.1 Date code format-seal/mold date code (for prior to third quarter 2007)

YY WW T XX	
where:	
YY =	Last two digits of year in which product was seal/molded.
WW =	Work week in which the product was seal/molded.
T =	Alphanumeric character for the assembly location.
XX =	Alphanumeric running sequence between 00-99 (automatically assigned by the system).

Figure 1.2 Date code format (Fujitsu-legacy product)

Y WW A M 123	
where:	
Y =	Last digit of the year in which the product is marked.
WW =	Work week in which the product is marked.
A =	Alphanumeric character for the assembly location.
M =	Alphanumeric character for the mark and pack location.
123 =	Alphanumeric running sequence (automatically assigned by the system).

Figure 1.3 Date code format or mark date code (for third quarter 2007 & beyond)

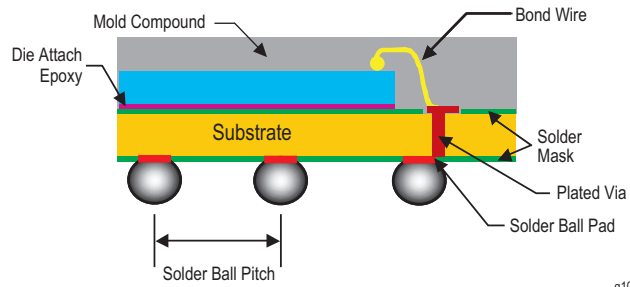
### BALL GRID ARRAY

The basic construction of the ball grid array (BGA) is that of wirebonded die on a substrate that is overmolded with encapsulant. Because the die is attached to a substrate, the package size is determined by the dimensions of the substrate instead of the die. This allows smaller, lower cost die, such as die shrinks, to be placed in the same BGA package without impacting the package dimensions or footprint.

For board assembly, BGA packages may be handled using standard surface-mount technology (SMT) equipment. No special handling or oven reflow profiles are required, and BGA packages may be mixed with other SMT components on the same board.

BGA packages are available with solder spheres composed of either SAC 105 (98.5% Sn, 1.0% Ag, 0.5% Cu) or SAC 305 (96.5% Sn, 3.0% Ag, 0.5% Cu). Other metal compositions may be available. Please contact your Spansion representative.

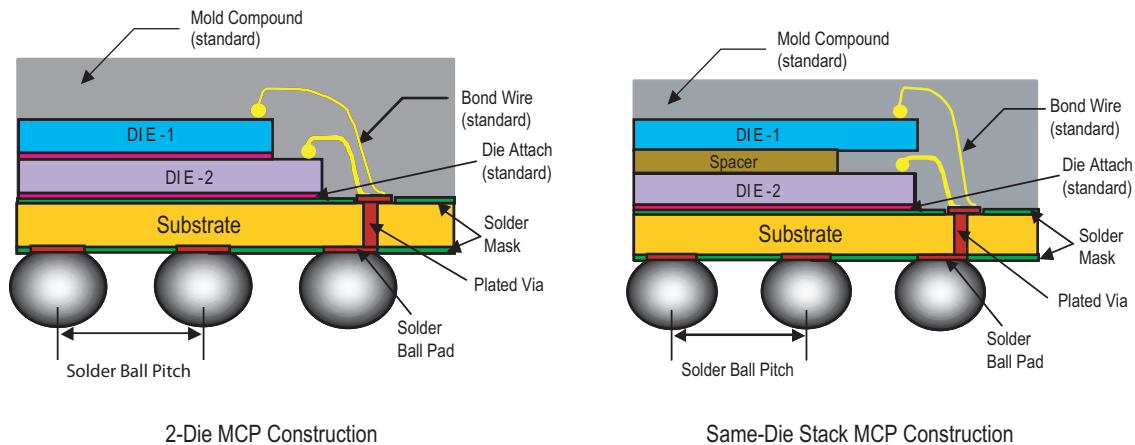
Spansion BGA packages are offered with both single-chip configurations as well as multi-chip configurations. See *Figure 1.4* for an example of the basic single-chip BGA package.



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*Figure 1.4 An example of single-chip BGA construction.*

With multi-chip packages (MCPs), the die, which are stacked one on top of the other on a substrate, are wirebonded to the top of the substrate and overmolded with encapsulant. If the die are of similar size, a spacer die is placed between the two die so that there is adequate space for the bond wire of the bottom die. See *Figure 1.5* for examples of MCP construction.



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*Figure 1.5 Examples of construction of Spansion multi-chip packages.*

The table below provides an overview of each product offering within the BGA package families. More detailed information can be found on the datasheets, which can be obtained from the Spansion website or your Spansion sales representative.

For details on the material content, as well as weight and moisture sensitivity level, of each individual package, see *Chapter 2 Package Materials*.

**Package Attribute Data: BGA Packages**

Package	Package Body Size (basic, mm)	Package Height (includes standoff) (maximum, mm)	Ball Pitch (mm)
ALD 128	12.00 x 12.00	1.10	0.65
ALF 128	12.00 x 12.00	1.05	0.65
ALG 128	12.00 x 12.00	1.10	0.65
ALH 160	15.00 x 15.00	1.10	0.65
ALJ 128	12.00 x 12.00	1.15	0.65
ALK 202	13.00 x 11.50	1.20	0.65
AMA 160	15.00 x 15.00	1.20	0.65
AMB 128	12.00 x 12.00	2.25	0.65
ASA 137	11.00 x 8.00	1.20	0.65
ASB 220	12.00 x 12.00	1.20	0.65
ASC 128	12.00 x 12.00	1.10	0.65
ASD 188	13.00 x 8.00	1.20	0.65
ASE 160	15.00 x 15.00	1.20	0.65
ASF 128	12.00 x 12.00	1.15	0.65
ASH 165	11.00 x 9.00	1.20	0.65
ATA 160	15.00 x 15.00	1.20	0.65
BEA 188	13.00 x 8.00	1.40	0.65
BFA 188	13.00 x 9.00	1.40	0.65
BNA 202	13.00 x 11.50	1.40	0.65
BNB 188	13.00 x 9.00	1.40	0.65
BTA 160	15.00 x 15.00	1.30	0.65
BWA 160	15.00 x 15.00	1.25	0.65
BWB 160	15.00 x 15.00	1.30	0.65
FAA 064	13.00 x 16.00	1.20	1.00
FAB 024	8.00 x 6.00	1.20	1.00
FAC 024	8.00 x 6.00	1.20	1.00
FBA 048	8.15 x 6.15	1.20	0.80
FBB 048	9.00 x 6.00	1.20	0.80
FBC 048	9.00 x 8.00	1.20	0.80
FBD 048	12.00 x 6.00	1.20	0.80
FBD 063	14.00 x 8.00	1.20	0.80
FBE 040	15.00 x 8.00	1.20	0.80
FBE 063	12.00 x 11.00	1.20	0.80

**Package Attribute Data: BGA Packages (Continued)**

Package	Package Body Size (basic, mm)	Package Height (includes standoff) (maximum, mm)	Ball Pitch (mm)
FBE 080	11.95 x 10.95	1.20	0.80
FBF 084	12.00 x 11.00	1.20	0.80
FDD 047	10.00 x 7.00	1.20	0.50
FDE 048	10.00 x 11.00	1.20	0.50
FEA 084	12.00 X 9.00	1.40	0.80
FEA 104	12.00 x 9.00	1.40	0.80
FEA 137	12.00 X 9.00	1.40	0.80
FEB 084	11.60 x 8.00	1.40	0.80
FEC 088	11.00 x 8.00	1.30	0.80
FED 084	12.00 X 9.00	1.40	0.80
FEE 088	11.00 X 8.00	1.30	0.80
FEF 103	11.00 x 9.00	1.40	0.80
FFA 084	12.00 x 9.00	1.40	0.80
FFA 115	12.00 x 9.00	1.40	0.80
FFB 084	11.60 x 9.00	1.40	0.80
FFC 115	13.00 x 9.00	1.55	0.80
FFD 115	13.00 x 9.00	1.55	0.80
FIA 084	12.00 x 9.00	1.40	0.80
FIB 137	13.00 x 11.00	1.60	0.80
FJA 137	13.00 x 11.00	1.60	0.80
FLA 069	11.00 x 8.00	1.40	0.80
FLB 073	11.60 x 8.00	1.40	0.80
FLB 093	11.60 x 8.00	1.40	0.80
FLG 103	11.00 x 9.00	1.40	0.80
FLJ 073	11.60 x 8.00	1.40	0.80
FLK 073	11.00 x 9.00	1.40	0.80
FMB 073	13.00 x 9.00	1.40	0.80
FBM 104	13.00 x 9.00	1.40	0.80
FMB 115	13.00 x 9.00	1.40	0.80
FMC 084	12.00 x 9.00	1.40	0.80
FMC 104	12.00 x 9.00	1.40	0.80
FMC 107	12.00 x 9.00	1.40	0.80
FMC 115	12.00 x 9.00	1.40	0.80



**Package Attribute Data: BGA Packages (Continued)**

Package	Package Body Size (basic, mm)	Package Height (includes standoff) (maximum, mm)	Ball Pitch (mm)
FMC 137	12.00 x 9.00	1.40	0.80
FMD 073	11.60 x 8.00	1.40	0.80
FME 103	11.00 x 9.00	1.40	0.80
FMH 107	12.00 x 9.00	1.40	0.80
FMI 137	13.00 x 11.00	1.40	0.80
FND 115	13.00 x 11.00	1.40	0.80
FND 137	13.00 x 11.00	1.40	0.80
FOA 115	12.00 x 9.00	1.55	0.80
FPB 115	13.00 x 9.00	1.40	0.80
FSA 063	12.00 x 11.00	1.70	0.80
FSB 073	11.60 x 8.00	1.55	0.80
FSC 073	11.60 x 8.00	1.40	0.80
FSD 063	12.00 x 11.00	1.40	0.80
FTA 073	11.60 x 8.00	1.40	0.80
FTA 084	11.60 x 8.00	1.40	0.80
FTA 088	11.60 x 8.00	1.40	0.80
FTD 088	11.50 x 9.00	1.40	0.80
FTE 073	13.00 x 9.00	1.40	0.80
FTE 115	13.00 x 9.00	1.40	0.80
FTF 084	12.00 x 9.00	1.40	0.80
FTF 115	12.00 x 9.00	1.40	0.80
FTF 137	12.00 x 9.00	1.40	0.80
FTG 115	12.00 x 9.00	1.40	0.80
FTI 084	12.00 x 9.00	1.40	0.80
FTJ 103	11.00 x 9.00	1.40	0.80
FTK 107	13.00 x 10.50	1.40	0.80
FTL 115	13.00 x 9.00	1.40	0.80
FTM 115	13.00 x 11.00	1.40	0.80
FTM 137	13.00 x 11.00	1.40	0.80
FUB 115	12.00 x 9.00	1.40	0.80
FVC 093	13.00 x 9.00	1.60	0.80
FVE 137	13.00 x 11.00	1.55	0.80
FWA 084	12.00 x 9.00	1.40	0.80

**Package Attribute Data: BGA Packages (Continued)**

Package	Package Body Size (basic, mm)	Package Height (includes standoff) (maximum, mm)	Ball Pitch (mm)
FWA 115	12.00 x 9.00	1.40	0.80
FWC 137	13.00 x 11.00	1.40	0.80
FWD 137	13.00 x 11.00	1.40	0.80
LAA 064	13.00 x 11.00	1.40	1.00
LAA 080	13.00 x 11.00	1.40	1.00
LAB 080	15.00 x 10.00	1.40	1.00
LAC 064	18.00 x 12.00	1.40	1.00
LAD 080	11.00 x 9.00	1.40	1.00
LAE 064	9.00 x 9.00	1.40	1.00
LIA 064	13.00 x 11.00	1.60	1.00
LSA 064	13.00 x 11.00	1.70	1.00
LSB 080	13.00 x 11.00	1.60	1.00
LSC 080	18.00 x 12.00	1.60	1.00
LSE 064	13.00 x 11.00	1.40	1.00
LSF 064	13.00 x 11.00	1.60	1.00
LSG 064	13.00 x 11.00	1.40	1.00
LSH 064	13.00 x 11.00	1.40	1.00
MMB 112	13.00 x 11.00	1.40	0.50
MTA 133	11.00 x 10.00	1.30	0.50
NLA 048	10.95 x 9.95	1.20	0.50
NLA 060	10.95 x 9.95	1.20	0.50
NLB 044	8.00 x 9.20	1.20	0.50
NLB 056	9.20 x 8.00	1.20	0.50
NLC 133	11.00 x 10.00	1.10	0.50
NLD 044	7.70 x 6.20	1.20	0.50
NLD 056	7.70 x 6.20	1.20	0.50
NLE 133	8.00 x 8.00	1.10	0.50
NSA 048	9.95 x 10.95	1.20	0.50
NSB 044	8.00 x 9.20	1.20	0.50
NSB 056	9.20 x 8.00	1.20	0.50
NSC 133	8.00 x 8.00	1.10	0.50
NSD 056	7.70 x 6.20	1.20	0.50
NSE 056	10.00 x 8.00	1.20	0.50

**Package Attribute Data: BGA Packages (Continued)**

Package	Package Body Size (basic, mm)	Package Height (includes standoff) (maximum, mm)	Ball Pitch (mm)
PIA 107	18.00 x 14.00	1.80	1.00
PNA 107	18.00 x 14.00	1.80	1.00
RLA 044	7.70 x 6.20	1.00	0.50
RLA 056	7.70 x 6.20	1.00	0.50
RLB 133	8.00 x 8.00	1.00	0.50
RLD 133	11.00 x 10.00	1.00	0.50
RLE 133	11.00 x 10.00	1.00	0.50
RLF 052	7.50 x 5.00	1.00	0.50
RLG 052	6.0 x 5.00	1.00	0.50
RSB 044	7.50 x 5.00	1.00	0.50
RSB 052	7.50 x 5.00	1.00	0.50
RSC 133	8.00 x 8.00	1.00	0.50
RSD 056	7.70 x 6.20	1.00	0.50
RSE 052	6.0 x 5.00	1.00	0.50
TLA 064	11.60 x 8.00	1.20	0.80
TLA 067	11.60 x 8.00	1.20	0.80
TLA 073	11.60 x 8.00	1.20	0.80
TLA 084	11.60 x 8.00	1.20	0.80
TLA 093	11.60 x 8.00	1.20	0.80
TLB 069	10.00 x 8.00	1.20	0.80
TLB 088	10.00 x 8.00	1.20	0.80
TLB 089	10.00 x 8.00	1.20	0.80
TLB 107	10.00 x 8.00	1.20	0.80
TLC 056	9.00 x 7.00	1.20	0.80
TLC 080	9.00 x 7.00	1.20	0.80
TLD 064	12.00 x 9.00	1.20	0.80
TLD 084	12.00 x 9.00	1.20	0.80
TLD 137	12.00 x 9.00	1.20	0.80
TLE 088	11.00 x 8.00	1.20	0.80
TLF 048	8.15 x 6.15	1.20	0.80
TLH 107	13.00 x 10.50	1.20	0.80
TLI 103	11.00 x 9.00	1.20	0.80
TLJ 138	10.00 x 10.00	1.20	0.80

**Package Attribute Data: BGA Packages (Continued)**

Package	Package Body Size (basic, mm)	Package Height (includes standoff) (maximum, mm)	Ball Pitch (mm)
TLK 137	13.00 x 11.00	1.20	0.80
TLM 137	11.50 x 9.00	1.20	0.80
TMA 084	12.00 x 9.00	1.20	0.80
TMB 115	13.00 x 11.00	1.20	0.80
TMB 137	13.00 x 11.00	1.20	0.80
TSA 088	11.00 x 8.00	1.20	0.80
TSB 064	11.60 x 8.00	1.20	0.80
TSB 084	11.60 x 8.00	1.20	0.80
TSC 056	9.00 x 7.00	1.20	0.80
TSC 080	9.00 x 7.00	1.20	0.80
TSD 084	12.00 X 9.00	1.20	0.80
TSD 137	12.00 x 9.00	1.20	0.80
TSE 064	10.00 x 8.00	1.20	0.80
TSE 088	10.00 x 8.00	1.20	0.80
TSE 107	10.00 x 8.00	1.20	0.80
TSF 107	13.00 x 10.50	1.20	0.80
TSG 103	11.00 x 9.00	1.20	0.80
TSH 137	11.50 x 9.00	1.20	0.80
TTA 084	11.60 x 8.00	1.20	0.80
T3A 137	13.00 x 11.00	1.20	0.80
UDA 048	6.00 x 5.00	0.52	0.50
VBB 080	11.50 x 9.00	1.00	0.80
VBB 088	11.50 x 9.00	1.00	0.80
VBC 080	11.95 x 10.95	1.00	0.80
VBD 064	8.95 x 7.95	1.00	0.80
VBE 088	11.95 x 9.65	1.00	0.80
VBF 048	8.15 x 6.15	1.00	0.80
VBG 080	11.00 x 8.00	1.00	0.80
VBG 088	11.00 x 8.00	1.00	0.80
VBH 064	11.60 x 8.00	1.00	0.80
VBH 084	11.60 x 8.00	1.00	0.80
VBJ 064	8.95 x 7.95	1.00	0.80
VBK 048	8.15 x 6.15	1.00	0.80

**Package Attribute Data: BGA Packages (Continued)**

Package	Package Body Size (basic, mm)	Package Height (includes standoff) (maximum, mm)	Ball Pitch (mm)
VBL 088	11.00 x 8.00	1.00	0.80
VBM 063	11.00 x 9.00	1.00	0.80
VBN 048	10.00 x 6.00	1.00	0.80
VBP 137	13.00 x 11.00	1.00	0.80
VBR 080	9.00 x 7.00	1.00	0.80
VBS 088	11.95 x 9.65	1.00	0.80
VBU 056	9.00 x 7.00	1.00	0.80
VBV 138	10.00 x 10.00	1.00	0.80
VBW 055	10.00 x 8.00	1.00	0,80
VBY 181	12.00 x 12.00	1.00	0.80
VCA 056	9.30 x 7.70	1.00	0.75
VCB 048	9.00 x 7.80	1.00	0.75
VCC 056	11.00 x 9.00	1.00	0.75
VCD 056	9.00 x 7.70	1.00	0.75
VCE 056	9.00 x 7.70	1.00	0.75
VDA 044	8.00 x 9.20	1.00	0.50
VDC 048	9.95 x 10.95	1.00	0.50
VDD 044	8.00 x 9.20	1.00	0.50
VDD 064	8.00 x 9.20	1.00	0.50
VDE 044	7.70 x 6.20	1.00	0.50
VDF 048	6.00 x 4.00	1.00	0.50
VDG 048	6.00 x 5.00	1.00	0.50
VDH 064	8.00 x 9.20	1.00	0.50
VDJ 044	7.70 x 6.20	1.00	0.50
VDL 044	7.50 x 5.00	1.00	0.50
VLB 107	10.00 x 8.00	1.00	0.80
VLD 063	11.00 x 9.00	1.00	0.80
VSA 084	11.60 x 8.00	1.00	0.80
VSF 107	10.00 x 8.00	1.00	0.80
WZA 052	7.00 x 5.00	0.80	0.65
ZSA 024	8.00 x 6.00	1.20	1.00

## LAND GRID ARRAY

The land grid array (LGA) is a grid array package with terminal pads on the bottom surface. The terminal pads are flat (no protruding pins) that touch contacts on a socket or can be soldered directly onto a printed circuit board (PCB). The following table provides the attribute data for Spansion's LGA package offerings.

For details on the material content, as well as weight and moisture sensitivity level, see *Chapter 2 Package Materials*.

### Package Attribute Data: LGA Packages

Package	Package Body Size (basic, mm)	Package Height (includes standoff) (maximum, mm)	Land Pitch (mm)
L1A 140	29.00 x 27.00	1.70	0.8
L2A 140	29.00 x 27.00	1.70	0.8
L3A 140	29.00 x 27.00	1.70	0.8
L4A 140	29.00 x 27.00	1.70	0.8

## LEADFRAME

**Surface-Mount Ledged Packages.** Developed in the late 1970's in response to the demand for cost-effective solutions to achieving greater board density without sacrificing reliability or functionality, surface-mount ledged packages are similar to traditional dual-in-line packages except that the lead tips are designed for surface-mounting. Spansion memory is offered in the following surface-mount ledged package families:

- Plastic Ledged Chip Carrier (PLCC)—J-Bend (4 sides)
- Plastic Quad Flat Package (PQFP)—Gull-wing (4 sides)
- Small Outline Package (SOIC)—Gull-wing (2 sides)
- Shrink Small Outline Package (SSOP)—Gull-wing (2 sides)
- Thin Small Outline Package (TSOP)—Gull-wing (2 sides)

**External Lead Designs**—The shape of the leads on surface-mount ledged packages are formed in either a gull-wing or J-bend shape. Both lead shapes offer the advantage of being flexible, which allows them to absorb thermal expansion mismatches between the package and the board.

- **Gull-Wing Lead Design** - Gull-wing leads are similar to dual-in-line, through-hole leads except that the leads are bent at the tips to rest flat on the board surface. This provides a built-in standoff between the package and the board, enabling thorough board cleaning and easy-to-inspect solder joints.

- **J-Bend Lead Design** - Like the gull-wing design, J-bend ledged packages can be mounted directly to the board, thus offering a built-in standoff and all the advantages inherent in this. A strong, inspectable bond is easily attainable provided the solder lands include extensions out from under the package. The J-bend design also allows easy socketing, which facilitates device testing and programming.

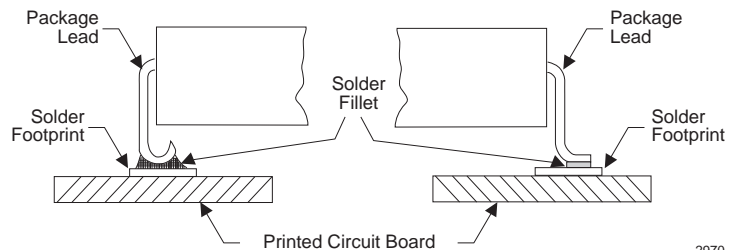


Figure 1.6 J-bend (left) and gull-wing (right) lead formations allow components to be mounted onto the surface of the circuit board.



**Leadframe Composition and Plating**—The tables below provide details of the leadframe composition and plating of Spansion surface-mount leaded packages.

Package	Leadframe	SnPb Plating % Sn	Pb-free Plating % Sn
PLCC (PL)	CDA 194	85	100
PQFP (PQR)	CDA 194	89	100
SOIC (SO)	CDA 194	85	100
SSOP (SSO)	C7025	85	100
TSOP (TS/TSR, T2/T2R)	CDA 194	85	100
TSOP (T2A/T2R 044 (040))	CDA 194 or C7025	85	100

**Material Composition: CDA 194**

Material	Weight %
Copper	97.45
Iron	2.40
Zinc	0.10
Phosphorus	0.05

**Material Composition: Alloy 42**

Material	Weight %
Iron	57.15
Nickel	42.0
Manganese	0.50
Silicon	0.25
Carbon	0.10

**Material Composition: C7025**

Material	Weight %
Copper	96.20
Nickel	3
Silicon	0.65
Magnesium	0.15

**Pb-free Plating Composition**

Characteristic	Matte Sn on Cu	SnBi on Alloy 42 <sup>1</sup>
Thickness	12-16 $\mu\text{m}$ (nominal)	8-10 $\mu\text{m}$ (nominal)
Grain Size	5 $\mu\text{m}$ (min)	3-5 $\mu\text{m}$
Carbon Content	< 500 ppm	< 500 ppm
Underlayers	None	None

Note

<sup>1</sup> SnBi on Alloy 42 is only available in limited offerings. Contact your Spansion sales representative for details.

**SnPb Plating Composition**

Characteristic	SnPb on Cu
Thickness	10-12 $\mu\text{m}$ (nominal)
Carbon Content	< 500 ppm



**Plastic Leaded Chip Carrier**—The PLCC package design is an attractive alternative to higher lead-count plastic DIPs because it can accommodate larger die sizes and offer the advantages of SMT.

The PLCC package construction consists of a device attached to the die pad of a leadframe, the circuitry of which is wire bonded to the lead fingers. A plastic epoxy material is injection-molded to encapsulate the device/leadframe configuration. The quad-directional leads are trimmed and formed to a J-bend formation. The 50-mil lead-pitch of a PLCC package is half the conventional lead spacing of a PDIP. This, coupled with the PLCC leads being located on all four sides of the package, greatly reduce the footprint.

As shown in the following table, Spansion memory is offered in a 32 leadcount PLCC package.

For details on the material content, as well as weight and moisture sensitivity level, see *Chapter 2 Package Materials*.

**Package Attribute Data: PLCC**

Package	JEDEC Drawing #	Package Body Size (nominal, inches)	Package Body Thickness (body only, inches)	Package Height <sup>1</sup> (nominal, inches)	Lead Pitch (inches)	Coplanarity (inches)
PL 032	MO-052 (A) AE	0.450 x 0.550	0.1175	0.1325	0.050	0.004

Note:

- 1 Package height data includes standoff.

**Plastic Quad Flat Package**—PQFP packages were developed primarily for high-leadcount applications. The finer lead-pitch of a PQFP enables this design to accommodate higher leadcount devices than desirable in PDIP, PLCC, and SOIC packages. As the benefits of the PQFP package configuration were realized within the industry, the design was extended to lower leadcounts.

The construction of this package consists of a device attached to the die pad of a leadframe, the circuitry of which is wire bonded to the lead fingers. A plastic epoxy material is injection-molded to encapsulate the device/leadframe configuration. The quad-directional leads are trimmed and formed to a gull-wing formation.

Spansion memory is offered in an 80-lead PQFP package, which complies with EIAJ package versions, as indicated in the package attributes table below.

For details on the material content, as well as weight and moisture sensitivity level, see *Chapter 2 Package Materials*.

**Package Attribute Data: PQFP**

Package	JEDEC Drawing #	Package Body Size (nominal, mm)	Package Body Thickness (nominal, mm)	Package Height <sup>1</sup> (maximum, mm)	Lead Pitch (mm)	Coplanarity (mm)
PQR 080	MO-108 (B) CB-1	14.00 x 20.00	2.80	3.35	0.80	0.10

Note:

- 1 Package height data includes standoff.

**Shrink Small Outline Package**—The SSOP package is a fine-pitch JEDEC version of the SOIC package. The package construction of the SSOP is the same as that of the SOIC package, both having gull-wing lead formations extending out from the two long sides of the rectangular package body. The SSOP package is different, however, in that it has a smaller lead pitch and is slightly shorter and thinner than a comparable SOIC package.

Spanion memory is offered in a 56-lead SSOP package, as indicated in the package attributes table below.

For details on the material content, as well as weight and moisture sensitivity level, see *Chapter 2 Package Materials*.

**Package Attribute Data: SSOP**

Package	JEDEC Drawing #	Package Body Size (nominal, mm)	Package Body Thickness (nominal, mm)	Package Height <sup>1</sup> (maximum, mm)	Lead Pitch (mm)	Coplanarity (mm)
SSO 056	MO-180 (A) BA	23.70 x 13.30	1.25	2.00	0.80	0.10

Note:

- 1 Package height data includes standoff.

**Small Outline Package**—The SOIC package is a surface-mount alternative for low leadcount devices. Its design is similar to the conventional dual-in-line (DIP) package.

The 1.27 mm lead pitch of SOIC packages allows for considerable reduction in package size over comparable PDIPs. Not only are SOIC packages smaller, they are lighter, too. This makes them ideal for foil/film mounting and virtually all automated board assembly operations.

Like PDIP packages, the SOIC package consists of a device attached to the die pad of a leadframe, the circuitry of which is wire bonded to the lead fingers. A plastic epoxy material is injection-molded to encapsulate the device/leadframe configuration. The leads extending from the two long sides of the rectangular package body are trimmed and formed to a gull-wing formation.

As shown below, Spanion memory is offered in three SOIC packages.

For details on the material content, as well as weight and moisture sensitivity level, see *Chapter 2 Package Materials*.

**Package Attribute Data: SOIC**

Package	JEDEC Drawing #	Package Body Size (nominal, mm)	Package Body Thickness (maximum, mm)	Package Height <sup>1</sup> (maximum, mm)	Lead Pitch (mm)	Coplanarity (mm)
SL3 016	MS-013(E)AA	10.30 x 10.30	2.55	2.65	1.27	0.10
SO 044	MO-180 (A) AA	28.20 x 13.30	2.30	2.80	1.27	0.10
SOA 008	MS-012 (D) AA	4.90 x 6.00	1.55	1.75	1.27	0.10
SOC 008	N/A	5.283 x 5.283	1.91	2.159	1.27	0.10
SO3 016	MS-013(D)AA	10.30 x 10.30	2.55	2.65	1.27	0.10
SS3 016	MS-013(E)AA	10.30 x 10.30	2.55	2.65	1.27	0.10

Note:

- 1 Package height data includes standoff.

**Thin Small Outline Package**—The thin profile of a TSOP package makes it attractive for memory devices, especially in portable applications. At 1 mm (40 mil), the package body is one-third to one-half as thick as an SOIC or PLCC package. This thinner profile, coupled with a 0.5 mm (20-mil) lead pitch, allows for considerable savings in the TSOP package volume over comparable PLCCs. This saves space on the board and between boards, contributing to a smaller, lighter system design.

Like other plastic encapsulated packages, the TSOP consists of a device attached to the die pad of a leadframe, the circuitry of which is wire bonded to the lead fingers. A plastic epoxy material is injection-molded to encapsulate the device/leadframe configuration.

On the Type 1 TSOP, the leads extend out from the two short sides of the rectangular package and are trimmed and formed to a gull-wing formation. On the Type 2 TSOP, the leads extend out from the two long sides.

Spansion memory is offered in standard and reverse pin-out 1 versions for both Type I and Type II TSOP devices. An overview of each TSOP package offering is presented in the table below.

For details on the material content, as well as weight and moisture sensitivity level, see *Chapter 2 Package Materials*.

#### Package Attribute Data: TSOP

Package	JEDEC Drawing #	Package Body Size (nominal, mm)	Package Body Thickness (nominal, mm)	Package Height <sup>1</sup> (nominal, mm)	Lead Pitch (mm)	Coplanarity (mm)
TS/TSR 032 (Type I)	MO-142 (D) BD	18.40 x 8.00	1.00	1.10	0.50	0.10
TS/TSR 040 (Type I)	MO-142 (D) DD	18.40 x 10.00	1.00	1.10	0.50	0.10
TS/TSR 048 (Type I)	MO-142 (D) DD	18.40 x 12.00	1.00	1.10	0.50	0.10
TS/TSR 056 (Type I)	MO-142 (D) EC	18.40 x 14.00	1.00	1.10	0.50	0.10
TS2 048	MO-142 (D) DD	18.40 x 12.00	1.00	1.10	0.50	0.10
T2A/T2R 044 (040) (Type II)	MO-024 (C) AC	18.41 x 10.16	1.00	1.20	0.80	0.10
T2A 050 (Type II)	MS-024 BC	18.41 x 10.16	1.00	1.20	0.80	0.10

Note:

- 1 Package height data includes standoff.
- 2 Contact your Spansion sales representative for this data.



**Through-Hole (Leaded) Packages.** Developed in the 1960's, through-hole board mounting requires that the package leads be inserted into plated through-holes in the circuit board. Once inserted, the leads are soldered to secure the electrical connection. This mounting technology ensures a mechanically strong solder bond in which the thermal mismatches of the leads and board material can be more easily tolerated. Plated through-holes on the circuit board, however, are costly and require that the component occupy more space on the board than is needed with surface-mount technology.

**Leadframe Composition and Plating**—The tables below provide details of the leadframe composition and plating of Spansion through-hole leaded packages.

Package	Leadframe	SnPb Plating % Sn	Plating Thickness (nominal) $\mu\text{m}$
PDIP	CDA 194	85	10-12

Material Composition: CDA 194	
Material	Weight %
Copper	97.45
Iron	2.40
Zinc	0.10
Phosphorus	0.05

Material Composition: A151	
Material	Weight %
Copper	99.9
Zirconium	0.1

**Plastic Dual-in-Line**—The PDIP package design, the long established industry standard, continues to be used in semiconductor technologies such as logic, memory, microcontrollers, and video controllers.

The PDIP package consists of a device attached to the die pad of a leadframe, the circuitry of which is wire bonded to the lead fingers. A plastic epoxy material is injection-molded to encapsulate the device/leadframe configuration. The leads are trimmed and formed to a through-hole lead design, with lead extensions along the two long ends of the rectangular package.

As shown below, Spansion memory is offered in a 32-lead PDIP package.

For details on the material content, as well as weight and moisture sensitivity level, see *Chapter 2 Package Materials*.

**Package Attribute Data: PDIP**

Package	JEDEC Drawing #	Package Body Size (nom, inches)	Package Body Thickness (nom, inches)	Package Height <sup>1</sup> (nom, inches)	Lead Pitch (inches)
PD 032	MO-015 (G) AP	1.655 x 0.555	0.1450	0.1825	0.100

Note:

1 Package height data includes standoff.

**No Lead Packages.** Leadless packages have been around for many years. Recently, new thinner designs of these types of packages have been developed.

*Very Very Thin Small Outline No Lead Package*—The WSON package was developed to be used in height-sensitive products. The WSON package is significantly thinner than Spansion’s eight-lead SOIC package.

The following table provides the attribute data for Spansion’s WSON package offering.

For details on the material content, as well as weight and moisture sensitivity level, see *Chapter 2 Package Materials*.

**Package Attribute Data: WSON**

Package	Package Body Size (nominal, mm)	Package Body Thickness (maximum, mm)	Pitch (mm)
WND 008	5.00 x 6.00	0.80	1.27
WNF 008	6.00 x 8.00	0.80	1.27
WNG 008	6.00 x 8.00	0.80	1.27
WNH 008	6.00 x 8.00	0.80	1.27

*Ultra Thin Small Outline No Lead Package*—The USON package, like the WSON package, was developed to be used in height-sensitive products.

The following table provides the attribute data for Spansion’s USON package offering.

For details on the material content, as well as weight and moisture sensitivity level, see *Chapter 2 Package Materials*.

**Package Attribute Data: USON**

Package	Package Body Size (nominal, mm)	Package Body Thickness (maximum, mm)	Pitch (mm)
UNE 008	5.00 x 6.00	0.55	1.27

*Very Thin Quad Flat No Lead Package (VQFN)*—Spansion memory is available in a VQFN package design.

The following table provides the attribute data for Spansion’s USON package offering.

For details on the material content, as well as weight and moisture sensitivity level, see *Chapter 2 Package Materials*.

**Package Attribute Data: VQFN**

Package	Package Body Size (nominal, mm)	Package Body Thickness (maximum, mm)	Pitch (mm)
VQA 024	10.00 x 10.00	0.90	1.27