Data Sheet

MicroLeadFrame® Quad Flat No-Lead Package (MLF®/QFN/SON/DFN)

Amkor's *Micro*LeadFrame® QFN package is a near CSP plastic encapsulated package with a copper leadframe substrate. This package uses perimeter lands on the bottom of the package to provide electrical contact to the PWB. The package also offers Amkor's ExposedPad technology as a thermal enhancement. Having the die attach paddle exposed on the bottom of the package surface provides an efficient heat path when soldered directly to the PWB. This enhancement also enables stable ground by use of down bonds or by electrical connection through a conductive die attach material.

MLF Offerings

- Chip-on-Lead (COL)
- Single Row (Up to 108 I/O)
- Dual Row (Up to 180 I/O)
- Multi Chip Package
- Non-Exposed Pad
- PPF (NiPd) Punch & Saw MLF
- Small MLF (Less than 2 x 2 body size)
- Stacked Die
- Thin *Micro*LeadFrame®
- Top Exposed Pad (TEP)
- Inframe Cavity MLF
- Flipchip MLF

Dual Row MLF Package

An MLF package with two rows of leads offers a cost effective, high performance solution for devices requiring up to 180 I/O. Typical applications include hard disk drives, USB controllers and wireless LAN.

Applications

The small size and weight along with excellent thermal and electrical performance make the *Micro*LeadFrame package an ideal choice for handheld portable applications such as cell phones and PDAs or any other application where size, weight and package performance are required.

*Micro*LeadFrame® MLF®/QFN/SON/DFN

Features

- Small size (reduce package footprint by 50% or more and improved RF performance) and weight
- Standard leadframe process flow and equipment
- 0.4 mm to 2.03 mm maximum height
- 4 to 180 I/O
- 1-13 mm body size
- Thin profile and superior die-to-body size ratio
- Pb-free/Green
- Flexible designs for optimal electrical and thermal performance
- Saw and punch versions available

Thermal Performance

Multi-layer PCB

Pkg	Body Size (mm)	# Board Vias	Exposed Pad (mm)	Die (mm)	ΘJA (°C/W)
12 ld	3 x 3	1	1.25	1.25	61.1
28 ld	5 x 5	9	2.7	2.54	34.8
44 ld	7 x 7	16	4.8	3.81	24.4
52 ld	8 x 8	25	6.1	5.08	20.9
64 ld	10 x 10	36	7.1	2.79	29.4
124 ld	10 x 10	36	7.1	2.79	30.0

JEDEC Standard Test Boards
Modeled data @ 0 air flow

Electrical Performance

Pkg	Body Size (mm)	Lead	Inductance (nH)	Capacitance (pF)	Resistance (mΩ)
12 ld	3 x 3	Longest	0.564	0.203	141.8
12 ld	3 x 3	Shortest	0.531	0.220	138.9
44 ld	7 x 7	Longest	1.766	0.326	315.1
44 ld	7 x 7	Shortest	1.194	0.289	234.5
64 ld	10 x 10	Longest	2.179	0.518	337.5
64 ld	10 x 10	Shortest	1.475	0.409	250.8

Simulated Results @ 2 GHz
Values dependent on specific die and wire configurations

Reliability Qualification

Amkor devices are assembled in optimized package designs with proven reliable semiconductor materials.

- Moisture Sensitivity Characterization — JEDEC Level 1*, 85°C/85% RH, 168 hrs
- uHAST — 130°C/85% RH, 96 hrs
- Temp/Humidity — 85°C/85% RH, 1000 hours
- Temp Cycle — -65°C/+150°C, 1000 cycles
- High Temp Storage — 150°C, 1000 hours

*Depending on body size

Visit Amkor Technology online for locations and to view the most current product information.

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Rev Date: 9/12

*Micro*LeadFrame®
MLF®/QFN/SON/DFN

Process Highlights

- Die thickness — .20 ± .05 mm nominal, thinner for special applications
- Plating — Matte Sn, NiPdAuAg
- Marking — Laser

Standard Materials

- Leadframe — Copper alloy, dual gauge
- Die attach — Conductive epoxy
- Wire — 0.8 mil Au, 1% PD doped, 0.8 mil Cu
- Mold compound — Pb-free/Green capable

Test Services

- Program generation/conversion
- Product engineering
- Available test/handling technology
- Burn-in capabilities
- Tape and reel services

Shipping

- Clear anti-static tubes, bakable trays or metal canisters

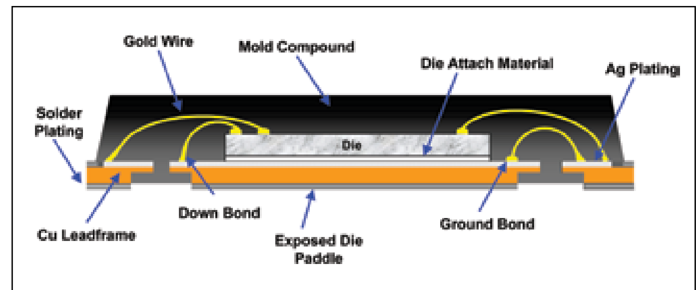
Configuration Options

MLF Package Family (mm)

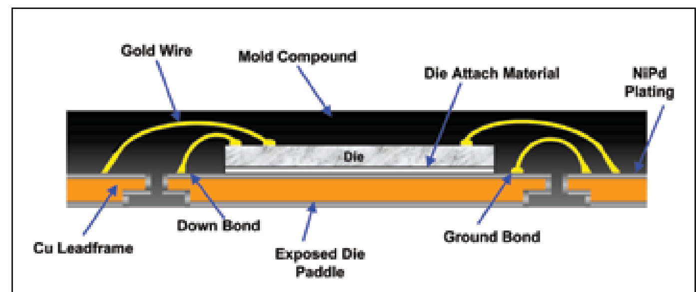
Body Size (mm)	QFN/SON/DFN Lead Counts 0.8, 0.65, 0.5, 0.4, 0.35, 0.3 mm Pitch	Dual Row Lead Counts 0.5 mm Pitch
<2 x 2 (saw only)	–	–
2 x 3	–	–
3 x 3	4/8/10/12/16/20/24	–
4 x 4	12/16/20/24/28/32/40	–
5 x 5	16/20/28/32/36/40/44/52	44/52
6 x 5	18/24/36/42	–
6 x 6	20/24/28/36/40/48/56/64	60/68
7 x 7	28/32/36/44/48/56/68/80	76/84
8 x 8	32/36/40/52/56/68/76/88	92/100
9 x 9	36/44/48/60/64/76/88/104	108/116
10 x 10	44/52/56/68/72/88/100/116	124/132
11 x 11	–	140/148
12 x 12	48/60/84/88/100/108/124/144	156/164
13 x 13	–	164/180

Cross-sections MLF

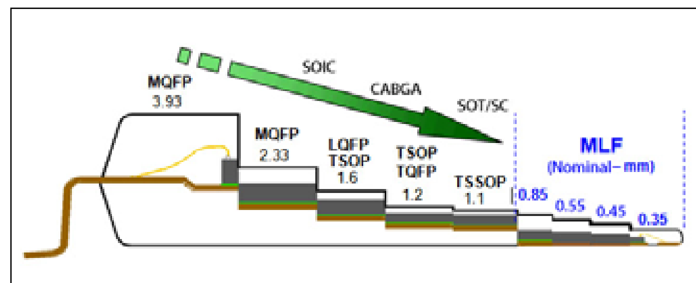
Individual Unit Design "Punch"



Map Design "Saw"



Package Height Comparison



Save valuable board space with MLF!

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