Data Sheet

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

Amkor's MicroLeadFrame 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 MicroLeadFrame
- Small MLF (Less than 2 x 2 body size)
- Stacked Die
- Thin MicroLeadFrame
- Top Exposed Pad (TEP)
- Inframe Cavity MicroLeadFrame
- Flip Chip MLF (fcMLF)
- Routable MLF (RtMLF)
- Wettable Flanks (PEL)

Applications

The small size and weight along with excellent thermal and electrical performance make the MicroLeadFrame 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.

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

*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
- Excellent thermal and electrical performance
- 0.43 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 and high yields
- 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 Shortest	0.564 0.531	0.203 0.220	141.8 138.9
44 ld	7 x 7	Longest Shortest	1.766 1.194	0.326 0.289	315.1 234.5
64 ld	10 x 10	Longest Shortest	2.179 1.475	0.518 0.409	337.5 250.8

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 BOM, body size and design

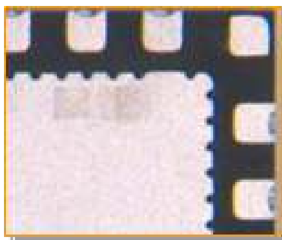
*Micro*LeadFrame®
MLF®/QFN/SON/DFN

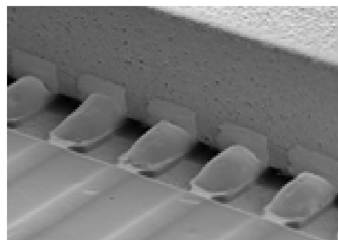
Dual Row MLF Package

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.

Saw MLF Wettable Flanks Package

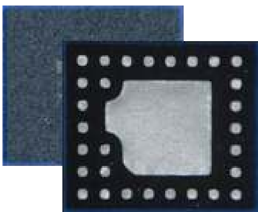
This package meets customer requirements for the automotive industry including: fine lead pitch (0.50 mm, 0.65 mm), higher solder fillet height on the side of lead area; similar or better BLR performance than standard design; and elimination of need for X-ray monitoring after SMD. Amkor has released this process to HVM (High Volume Manufacturing).

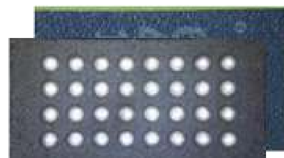




RtMLF (Routable Molded Lead Frame) Package

An MLF package with resin filled traces for small form factor driven structures. This offers a low cost, high thermal performance device in a smaller foot print. It has internal routing traces with limited line width/space capability and this package adapts easily to flip chip configurations. RtMLF provides higher pin count and more flexible internal trace routing with resin filled LF. This package enables small form factor, high electrical/thermal performance with low cost.





Process Highlights

- Die thickness — .20 ± .05 mm nominal, thinner for special applications
- Plating — Matte Sn, NiPdAu, Ag
- Marking — Laser
- IPD — Integrated passive devices
- Stack Die — Multiple die, pyramid or side by side combination

Standard Materials

- Leadframe — Copper alloy, dual gauge, PPF
- Die attach — Conductive epoxy or DAF, non-conductive epoxy or DAF
- Wire — Au, Cu, Au PCC, Ag
- Mold compound — Pb-free/Green capable
- Plating — Matte Sn, NiPdAu, Ag

Test Services

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

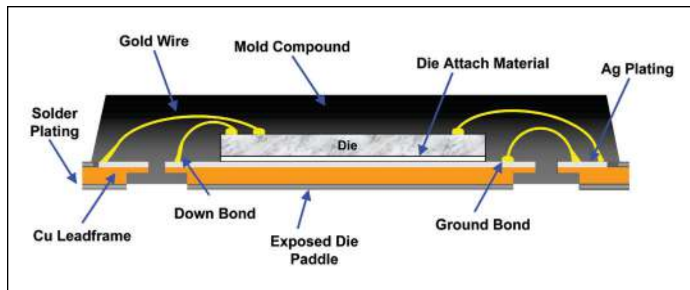
Shipping

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

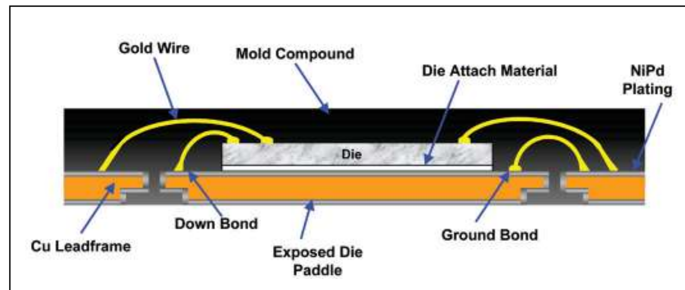
*Micro*LeadFrame®
MLF®/QFN/SON/DFN

Cross-sections MLF

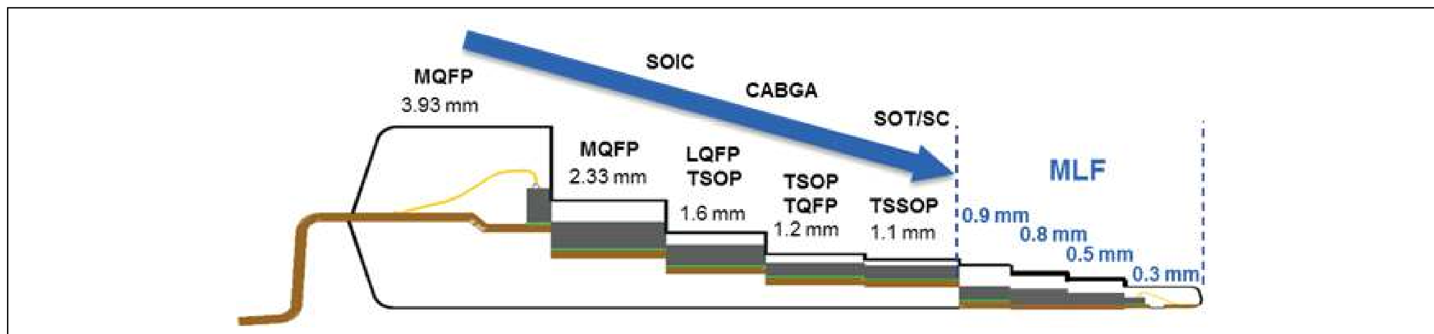
Individual Unit Design "Punch"



Map Design "Saw"



Package Height Comparison



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
Saw		Punch		
✓	1 x 1	–	4/ 6	–
✓	2 x 2	–	6/8/10/12	–
✓	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

Note: Various package sizes available between (1 x 1) through (3 x 3), i.e., (2.5 x 2.5), (2 x 1), (1.5 x 1.5)

MLF® packages save valuable board space!

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

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