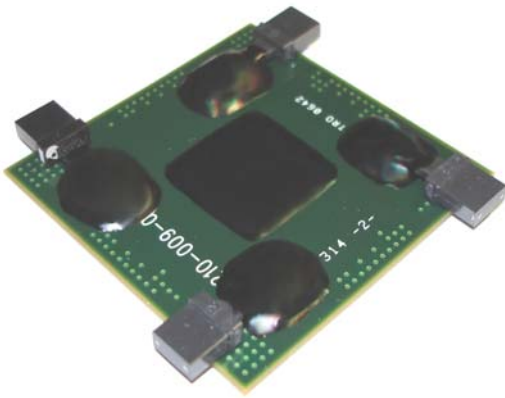


Optically-Enabled Ball Grid Array *Light On Board*[™] Flip-Chip Package

Optically Enabled FCBGA



Product Summary:

Reflex's Optical Flip-Chip BGA semiconductor packaging technology combines the benefits of optical transmitter and receiver interconnections with the advantages of wafer bumping technology. The ability to connect optical signal to the package effectively enables a Fiber-To-The-Chip connections. This innovative technology incorporates the most advanced assembly processes, which allows applications to maximize the bandwidth of semiconductor Integrated Circuits (ICs).

The high performance optical FCBGA packages introduce ASIC/SOC design flexibility by allowing optimized signal I/O placement. Each optical MT connector consists of up to 16 independent transmit or receive optical channels. Each channel is capable of transmitting up to 10 Gb/s up to 300m on 50 micron multimode fiber.

Additionally, the optical FCBGAs utilize industry proven, semiconductor grade materials for reliable, long-term operations while providing the user flexible design parameters. The packages have been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference and integrate Reflex's next generation, *LightABLE*[™] optical packaging technology.

Key Benefits:

- High-Speed Optical Transmit and Receive Capability Interconnected to the Chip
- Outstanding high-speed capabilities via *LightABLE*[™] optical technology
- Up to 960 Gb/s of Unidirectional Optical Bandwidth

Product Highlights:

- Signal placement throughout die
- Die sizes up to 400X400 mils
- Up to 1936 solder balls
- Custom packages in body sizes ranging from 35 x 35 mm to 45 x 45 mm
- 1.0 & 1.27 mm ball pitches available
- Controlled Impedance Electrical I/O
- Up to 96 optical channels
- Up to 10 Gb/s per channel optical performance
- Excellent Reliability
- Up to 10 Laminate Metal layers
- Optional grounded heat spreader
- Eutectic of Pb-free versions available

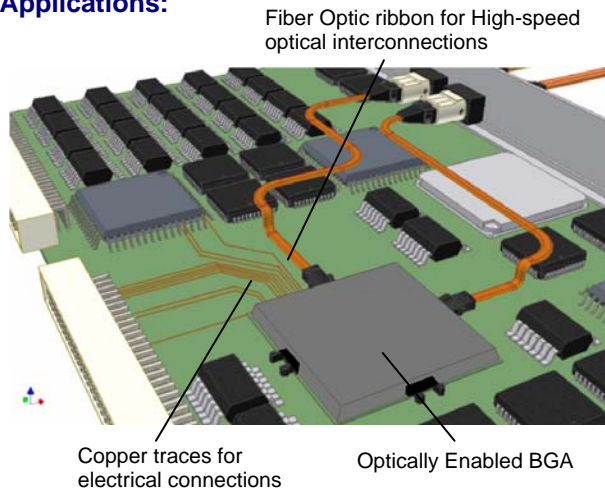
Applications:

- High-speed, high-power semiconductors:
 - ASICs
 - Microprocessors
 - DSP and FPGA requiring high-performance packages.
- Solution for bandwidth, power and space requirements of:
 - Internet Routers
 - Switches
 - Network Servers
 - Systems on a Chip

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Applications:



Reflex's optical semiconductor package is designed to provide the IC designers multiple optical inputs and outputs without changing either the microchip fabrication or the standard assembly and test methods used by IC and PCB manufacturers. Ultra-high speed electrical signals from the microchip are immediately converted into optical signals and passed to the outside world thus eliminating the need to external optics. Both performance and cost issues can then be addressed into the next decade by allowing the microchip to remain as an all-electrical processing unit where optical fiber is the ultimate conduit of high speed data to and from the microchip.

This approach enables applications to remove the need for external optical transceivers and therefore offers 4 key advantages:

- Significantly lower overall system cost
- Increased packaging density
- Increased high-speed signal fidelity
- Lower overall system power consumption

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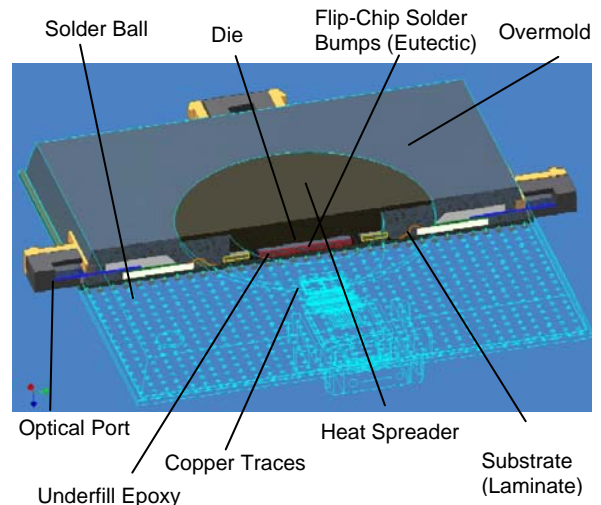
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Specifications:

Die Thickness: 500um Max.
Die Size: 15mmX15mm Max.
Bump Pitch: 200um Min.
Bump Pad: 100um Min.
Solder Balls: 63Sn/37Pb or Sn-Ag-Cu (RoHS Compliant)
Ball Pitch: 1mm or 1.27mm
Ball Size: 0.63mm or 0.76mm
Ball Inspection: Optical
Thickness: 4.5mm (excluding solder balls)

Wavelength: 850nm
Fiber Type: 50um or 62.5um multimode
Fiber Pitch: 250um
Bandwidth: up to 10 Gb/s per optical channel

OE-FCBGA Cross-Section:



Standard Configurations:

| Body Size (mm) | Maximum Ball Count | Optical I/O (Channels) |
|----------------|--------------------|------------------------|
| 35 X 35 | 1190 (34x34) | 48 or 96 |
| 37.5 X 37.5 | 1296 (36x36) | 48 or 96 |
| 40 X 40 | 1521 (39x39) | 48 or 96 |
| 42.5 X 42.5 | 1681 (41x41) | 48 or 96 |
| 45 X 45 | 1936 (44x44) | 48 or 96 |

For more information on this or other products:
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