Amphenol Other Board Level and Rectangular Interconnects

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Other Rectangular Interconnects Typical Markets:
- Medical Equipment
- Factory Automation
- IC Chip Testers
- GPS Systems, Telecommunications
- Military & Commercial Avionics
- Military Vehicles

Contact Amphenol Aerospace for more information at 800-678-0141 • www.amphenol-aerospace.com
Amphenol Aerospace has Extensive Heat Sink and Metal Machining Manufacturing Capability. Our experienced engineering group can design a custom heat sink to fit your board or work from your CAD models, assemblies, or step files.

Benefits of Amphenol’s Design and Manufacture of Custom Heat Sinks:

- Amphenol’s familiarity with major industry and military specifications.
- Amphenol has been leading the marketplace in LRM (Line Replaceable Module Connectors) and Rectangular Low Mating Force Connectors.
- Our LRM and VME64x products are used on major programs that include the following and more: F-35, F-16, F-15, F/A-22, F/A-18, B2, JTRS, EH101, Sincgars, ATACMS, M1A2 Tank, Gripen, F-117, Harpoon, LANTRIN, AH-64 APACHE, ASRAAM, ATFLIR
- This manufacturing and design excellence provides customers with the assurance that their custom or standard Amphenol rectangular connector will mate to their heat sink design.
- Amphenol is an ISO 9001 facility. Focus is always on quality with cost effectiveness and continuous improvement of processes.

Heat Sink Design Capabilities

- Provide manufacturing studies on prototype models, CAD models or drawing packages. (Consult Amphenol about acceptable CAD formats.)
- Provide rapid prototyping in house.
- Manufacture interface plates and other accessories; Design-in and install pins, studs and threaded inserts
- Provide extensive knowledge in geometric dimensioning and tolerancing techniques that can assist in optimizing your design to enhance manufacturability from the initial design phase (DFM).
- Provide ease of design for a variety of heat sink configurations and heat sink materials.
- Design flexibility for contact cavities for RF, digital I/O, high speed, fiber optic, power and low voltage data signal contacts.
- Provide in-process and final dimension checking
Heat Sink and Metal Manufacturing Capabilities, cont.

STATE-OF-THE-ART EQUIPMENT

At Amphenol, we have experience manufacturing a wide variety of custom heat sink designs. Our state-of-the-art twin spindle machines with multi-axis control, unique fixturing, and indexing guarantee true position tolerancing on multiple faces of a machined piece. Other manufacturing features include glass scales and HSK heat shrink tool holders for greater accuracy. In addition: through-spindle probing for in-process checks, through-spindle high-pressure coolant system, single spindle mills with rotary tables, and 3-axis mills which supplement the twin-spindle machine operations. Other key benefits and features of Amphenol's manufacturing operations include:

- The ability to handle high or low run quantities.
- Machines set up and used exclusively for heat sink and related component milling.
- Temperature controlled environment to reduce the effect of thermal expansion/contraction.
- Capability to hold very precise positional, size and profile tolerances.
- Use of CAM software to translate solid models to machine instructions. This allows for a quick transition between design and manufacturing, and ensures parts are held to the proper dimensional tolerances.
- CAM programs are optimized to each machine’s capabilities which minimizes run time and maximizes quality.
- Parts can be selectively plated and selectively machined to suit customer requirements.
- Amphenol has a preferred status with material suppliers which ensures timely procurement of raw materials.

Quality Assurance

- All dimensions are verified after machine setup, prior to production runs.
- Dimensions are checked by contact or optical Coordinate Measuring Machine (CMM).
- We import CAD/CAM files to our CMM’s to guarantee parts are within the design’s dimensional specifications.
- In addition to setup part checking, we also do 100% or sample part checking.
ARINC 404 & ARINC 600 Rack and Panel Connectors

Rack and panel ARINC 404 connectors meet or exceed MIL-C-81659 and ARINC Spec. 404. The ARINC 600 connector is the successor to the 404 for many avionic designs and offers lower mating force contacts, increased contact count and a front release, floating keying system. Other features of the ARINC 600 include:

- ARINC 600 connectors are a recognized standard rack and panel connector for aircraft applications with both environmental and non-environmental versions available.
- Designed to meet all relevant ARINC 600 connector specifications
- Front removable keying posts
- Up to 800 size 22 contact positions in one connector
- Contact options: standard contacts are power/signal crimp rear release in sizes 12, 16, 20 and 22 in crimp or PCB; or shielded coax, concentric twinax, quadrax contacts; or fiber optics
- Filtered or non-filtered
- Waveguide connections

See Amphenol Canada* publication, ARINC 600 Rack and Panel Connectors, for complete information and how to order.

R27 Rack and Panel Connectors

The R27 Series from Amphenol Canada is a robust rectangular connector designed to meet or surpass all the requirements of the ML-DTL-83527 specification and EN 3682 European Standard. Features of the R27 Series include:

- Well suited for harsh environments - enhanced environmental sealing, robust and durable shells, EMI shielding spring
- Filtered or non-filtered
- Connectors, shells, inserts, termination modules and contacts are sold separately or fully assembled
- Interchangeable insert patterns with ARINC 600 models
- Contact options: standard contacts are power/signal crimp rear release in sizes 12, 16, 20 and 22 in crimp or PCB; or shielded coax, concentric twinax, quadrax contacts; or fiber optics

See Amphenol Canada publication for R27 Series Connectors for complete information and how to order.

* Contact Amphenol Canada at:
605 Milner Avenue, Toronto, Ontario,
Canada M1B 5X6
Phone: 416-291-4401  Fax: 416-292-0647
www.amphenolcanada.com
R39 Series with High Performance 38999 Features
The R39 series from Amphenol Canada* provides high performance in the severe environment demands of military specifications. Its lower profile translates into a smaller space-saving footprint. It delivers the same reliable, familiar benefits found in Amphenol’s 38999 circular connectors: effortless installation, blind push-pull mating, extreme durability, quick mate. Features of the R39 Rectangular Connector series include:

- Low profile and space savings
- High density 127 position inserts or mixed inserts with power, RF or fiber-optics
- Uses same contacts and tooling as standard 38999 connectors
- Blind mate
- Rugged
- Filtered or non-filtered

See Amphenol Canada* publication R39 for complete information and how to order.

R58 Series Designed to Requirements of MIL-DTL-83733 and JN1122
The R58 series from Amphenol Canada* are high performance environment-resistant, rectangular connectors designed to exceed the requirements of MIL-DTL-83733 and to meet the EFA requirements of JN1122. Features of the R58 Series include:

- Well suited for hostile military aircraft applications where environment is an issue or shielding effectiveness and corrosion resistance is mandatory
- Available in 2 shell sizes with a variety of hard and spring mounting configurations
- Broad range of contact arrangements available from custom to 185 standard contacts
- Crimp contacts or PCB in sizes 12, 16, 20 and 22D. Coax, twinax, triax, quadrax and fiber optics also available
- Filtered version is also available (458 series)
- Shells are machined aluminum alloy with several finish options, including OD chromate over cadmium over electroless nickel finish.
- Insulators are high grade, plastic to MIL-M-14
- Silicone rubber is used for grommets, interfacial seals and peripheral seals

See Amphenol Canada* publication, “Infinite Possibilities”, Amphenol Rectangular and Filtered Products, for complete information and how to order.

R393 Series Low Profile Connectors with High Speed RF Contacts
A product line developed from the R39, the R393 contains 38999 Series III high speed RF contacts. These connectors have a low profile, light-weight design, and are ideal for a maximum number of high speed contacts using a small amount of space. Consult Amphenol Canada for more information and how to order. Features include:

- Qualified to BACC65BY and BACC65BW specifications
- Size 8 high speed RF 38999 contacts
- Environmental and filtered options available
- Multiple shell sizes, including custom geometry
- Captive hardware and backshells available

* Contact Amphenol Canada at:
605 Milner Avenue, Toronto, Ontario, Canada M1B 5X6
Phone: 416-291-4401 Fax: 416-292-0647
www.amphenolcanada.com
Amphenol Offers a Full Range of Rectangular Interconnects that Provide Filter Protection

Filter rectangular connectors are used to provide cost and space effective solutions to EMI problems in a wide range of military and commercial applications including avionics systems, satellites, missiles, communications, control systems and tempest equipment. Amphenol’s unique solder-less construction which reduces stress on the ceramic elements and results in superior physical and thermal shock capabilities.

Filtering is available in the following Amphenol rectangular connectors:
- ARINC 404 & ARINC 600
- R39 - Rectangular 38999
- 458 - M83733 Style
- Micro-D
- D-Sub
- R27
- R64F Filtered Docking Connector
- D83 Compact D-Sub
- Filtered Headers and Custom Designs

D-Sub Connectors

Amphenol Canada supplies D-Subminiature Rectangular Connectors:
- SD308 Sealed D-Subs
- 308/481 Filtered D-Sub
- C308 Press-fit D-Subs (NAFI contact)

Features of D-Sub connectors include:
- Standard density and hi-density insert arrangements with pin and socket contacts
- Fixed screw machine contacts, available in solder cup, straight PCB, right angle PCB
- EMI filter D-Sub connectors use planar capacitors

Micro-D (M83513 Style) Connectors

A small connector solution which exceeds the requirements of military M83513, the Micro-D connector is provided by Amphenol. Features include:
- Rack and Panel mounting, or panel mount, cable mount or PCB mounting
- Used where space and weight are at a premium
- Wire harness, vertical and right angle PCB terminations
- Filtered or non-filtered
- Press-fit contact

Microminiature Connectors

Series 106 Microminiature Card Connectors were also designed to meet the requirements of MIL-DTL-83513. Features include:
- High density
- Board, panel and cable mounting for card-to-card and card-to-cable applications
- Employs a D-shape for correct mating, Jack screws and jack posts
- Wire harness, vertical and right angle PCB terminations

105 Series Microminiature Strip Connectors provided by Amphenol Phoenix*
Features include:
- Single row strip line configuration
- Board, panel and cable mounting
- Guide pins, jack screws
- Wire harness, right angle PCB, surface mount terminations
For over 40 years, Amphenol Backplane Systems (ABS) has been a leading manufacturer of backplane assemblies and enclosures for military and aerospace applications. ABS combines a wide range of innovative product and process technologies, advanced component manufacturing, and process control with highly focused, customer-specific program management and testing at the assembly level. In addition, we provide expert design and unsurpassed applications engineering assistance at every step of the way.

Amphenol Backplane Systems production capabilities are the result of investment in new state-of-the-art equipment and software such as:

- Press-fit installation
- Through-hole soldering
- Automated hi-temp soldering
- Large-format surface mount soldering
- Aqueous cleaning
- Conformal coat (type UR and XY)
- Electrical test

For electrical testing, ABS offers Level I (bareboard), Level II (post assembly), and Level III (in-circuit) capabilities. Our industry-leading large-format surface mount line with a capability of up to 29” X 60” circuits is well-positioned for the largest backplanes in the industry as well as volume production of standard backplane products.

Our advanced manufacturing support software allows us to maintain our world-class configuration control as well as create a state-of-the-art visual workplace to ensure we are exceeding customer expectations. Our in-house capability for environmental testing such as Environmental Stress Screening (ESS) supports the increasing customer need for product assurance. We have also expanded our manufacturing capability to include:

- Enclosure and Value-added Assembly
- High-end Cable and Flex Assemblies
- Integrated Bus Systems
- Machined Enclosures and Metal Faceplates

In support of the continued need for leading-edge technology coupled with best cost manufacturing, we have established a qualified DoD Manufacturing Licensing Agreement (MLA) approved work center at our Amphenol Nogales, Mexico campus. This site is a duplication of our Nashua, New Hampshire manufacturing capability and will meet the needs of programs looking for a low cost option, while remaining in North America.

ABS MIL-Specified qualifications include MIL-C-28859 (for components) and MIL-A-28870 (for assembled backplanes).

**Amphenol’s Solutions - The Pinnacle of Technology**

Some of the world’s most demanding programs rely on Amphenol’s packaging solutions, including:

- F-35
- F-22
- F-18
- MIDS/JTRS Radio
- Theatre High Altitude Air Defense Radar (THADD)
- AH-64 Apache
- 787 Dreamliner
- Future Combat Systems
- DDG-51
- DDG-1000


* See page 12 for more information about Amphenol Integrated System Solutions.
UHD Series with Fork and Blade Contacts

Amphenol's wide range of board level interconnects also includes high density UHD (Ultra High Density) Series module and backplane connectors. These utilize fork and blade contacts in a staggered grid pattern for attachment to printed circuit boards. The staggered pattern is 80 contacts per inch, .025 pitch in 8 rows. They are SEM-E format and are qualified to: EIA 15-763, DESC 89065, IEEE 1101.1 to 1101.9. SU configurations are also available.

The UHD module connectors have surface mount blade contacts and the mating UHD backplane connectors have solderless compliant press-fit tuning fork contacts. There are a wide range of high contact density patterns and the length and style can be tailored to meet customer requirements. They are rigid pin terminated to the board or flex terminated to the board. Coax, fiber optics and power contacts can also be integrated into the connector configuration. Other options include EMI shielding and UHD interconnects can be provided in a stacking configuration. Module covers can be integrated into the connector system. Extender board connector configurations are also available so that customers can have access to probe and test modules that are electrically connected to the backplane.

Standard configurations of UHD connectors are:

- 372 pin
- 300 pin multi-purpose (fiber optic, coax, power contacts can be intermixed
- 296 pin with 270V power contacts
- 292 pin with coax
- 396 pin Futurebus + SEM-E
- 556 pin Futurebus + 10 SU (designs up to 680 contacts)

UHD Series connectors are provided by Amphenol Backplane Systems division of Amphenol. These connectors are a proven interconnect solution for advanced, high-reliability packaging requirements in markets of military and commercial aviation, space applications, shipboard applications, military vehicles, C4I electronics and ordnance. For more information see catalog 12-036 on-line at www.amphenol-abs.com.
NAFI Connectors with Fork & Blade Contacts,
I/O NAFI with Rear Removable Crimp Contacts
FROM AMPHENOL BACKPLANE SYSTEMS DIVISION

NAFI Series with Fork and Blade Contacts
Amphenol NAFI daughtercard and backplane connectors are another board level interconnect solution from Amphenol Backplane Systems. They provide a wide range of medium contact density patterns and meet MIL-C-28859 standards. Daughtercard termination is though-hole, using nickel/gold solder plated contacts. The mating interface is a blade contact which can be either parallel or perpendicular to the daughtercard.
The M Series of NAFI connectors are for through hole interconnection to printed circuit boards with rigid pin termination. Connector lengths and body styles can be tailored to meet specific needs. They are available with 2, 3, 4 and 5 rows of contacts, .100 X .100 pitch. Standard NAFI-style features such as guide pins and D-and V-shaped polarizing keys are available.
The FM Series of NAFI connectors are for surface mount interconnection to printed circuit boards with flex circuit termination. Up to 5 rows of contacts can be configured. The standard NAFI interface is maintained while the flexible circuit traces provide the link to the module. The flexible circuit termination allows for hand soldering or various automated surface mount soldering processes. To meet customer needs, connector lengths and body styles can be tailored, and the flex circuitry lengths and configurations also are designed per customer specifics. NAFI backplane connectors use solderless, compliant press-fit tuning fork contacts.

I/O NAFI Series with Rear Removable Crimp Termination
Amphenol also provides an I/O NAFI interconnect that allows for terminating #22 and #26 gauge stranded wires to a backplane. It is available with 24, 36, 40 or 120 rear removable crimp-style blade contacts and includes captive hardware and polarizing features. The receptacle (tuning fork) connector can be placed where needed on either side of the backplane.
NAFI interconnects are used in military and commercial aviation, in space applications, shipboard and in military vehicles. For more information see catalog 12-036 from Amphenol Backplane Systems, on-line at www.amphenol-abs.com.
## Amphenol Printed Circuits’ (APC) Capabilities

Proven engineering and manufacturing expertise in the manufacture of printed circuit boards has been provided by the APC division of Amphenol for more than 25 years. Consistent quality and reliability for demanding high bandwidth systems and mission critical applications is met along with optimization in material handling. APC provides tightly controlled processes for prototype through productions of printed circuit boards. The chart below shows the Printed Circuit Board capability of Amphenol Printed Circuits.

### Design Formats
- Mentor
- PADS
- Cadence
- Zuken

### Manufacturing Formats
- ODB++ (preferred)
- DXF
- Gerber 274X
- Autoplot
- Excellon
- HGPL
- DPF
- Gerber 274D
- IPC D 356

### Maximum Panel Size
- 24” x 54” (609.5mm x 1371.5mm)
- 30” x 44” (762.0mm x 1117.5mm)
- 36” x 42” (914.4mm x 1066.8mm)

### Maximum Panel Thickness
-.500” (12.7mm)

### Layer Count
Up to 64

### Interconnect Formation Types
- Back drilled
- Dual Diameter
- Thru Hole*
- Blind (laser & mechanical*)
- Electrically isolated
- Buried
- SMT
  *
  with conductive and non-conductive via fill

### Aspect Ratio - Drilled Size
- Compliant holes > +.225 (drilled size 17:1)
- Via holes <.022 (drilled size 13:1)

### Finished Hole Size
- Compliant Pinned: 0.018” (0.457mm)
- Via (A/R dependent): 0.008” (0.203mm)
- Buried Vias: 0.006” (0.152mm)
- Microvias (up to 3 electrical layers) (0.101mm)

### Blind Via Aspect Ratio
1.25:1

### Internal Features
- Lines: 0.003” (0.0762mm) .5 oz. copper
- Spacing: 0.003” (0.0762mm) .5 oz. copper
- Buried Resistors: No
- Buried Capacitance: No
- Minimum Core Thickness: 0.0001” (0.0254mm)

### External Features
- Lines: 0.004” (0.1016mm) .5 oz. copper
- Spacing: 0.004” (0.1016mm) .5 oz. copper

### Materials*
- Low Tg FR4 (including phenolic cure)
- Getek
- Nelco 4000-13 & Nelco 4000-13 SI
- Rogers 4350/Fr4
- BT
- High Tg FR4 (including phenolic cure)
- Isofr408
- Rogers 4350
- Polymide
- Cyanate Ester
- Megatron 6

### Copper Processing
- 1/4 oz. - 10 oz. copper (U/L 7 oz.)

### Impedance
- Single & Differential
  - ±10%
  - ±7.5%
  - ±5.0%

### Surface Finishes
- Electrolytic Ni/Au
- HASL
- Immersion Tin
- Reflowed Tin/Lead
- ENIG
- Immersion Silver
- OSP-Entek 106

### Certifications
- IPC A 600 Class I, II & III
- ITAR Registration
- MIL-PRF-31032/2a
- IPC-6012 Class I, II & III
- ISO 14001:1996
- MIL-PRF-31032/lb.
- MIL-P-55110

* Please contact APC for the availability of additional materials.

### For more information contact:
Amphenol Printed Circuits, Inc.
91 Northeastern Blvd.
Nashua, NH 03062
Phone: 603-324-4500
www.amphenolprintedcircuits.com

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**Variety of Printed Circuit Boards from APC**
Flexible and Rigid-Flex Capabilities

Amphenol Printed Circuits Division is a world leader in printed circuits, manufacturing highly complex Backplanes, Daughter-Cards, Flex and Rigid-Flex assemblies. Located for over 30 years in New Hampshire, APC has been delivering high quality circuits to the Defense and high-end Commercial markets, on time and within budget. While manufacturing a highly diversified product line specializing in technically challenging Rigid-Flex assemblies, we are also able to deliver low cost, lower layer count Flex and their assemblies, in today's price-competitive environment. Often an afterthought, Flex and Rigid-Flex allows designers to shrink packaging and think around corners. Below is a list of some of our capabilities.

| DESIGN FORMATS | • DXF  • Gerber  • IGES • Pads  |
| PANEL SIZE | • 12" x 18" (304.8mm x 457.2mm)  • 18" x 24" (457.2mm x 609.6mm)  • 24" x 24" (609.5mm x 609.5mm)  • 24" x 36" (609.5mm x 914.4mm)  • 24" x 54" (609.5mm x 1371.5mm)  |
| PANEL THICKNESS | .003"-.225" (0.0762mm - 5.715mm)  |
| LAYER COUNT | 1-30+  |
| INTERCONNECT FORMATION TYPES | • Thru Hole  • Buried  • Blind  • SMT  • Filled Via's  • Dual Diameter  |
| FINISHED HOLE SIZE | • Compliant Pinned (rigid zone only): 0.018" (0.457mm)  • Via (A/R dependent): 0.008" (0.203mm)  • Buried Vias: 0.006" (0.152mm)  • Microvias (up to 3 electrical layers): 0.004"-.006" (0.101mm)  |
| BLIND VIA ASPECT RATIO | 1.25:1  |
| INTERNAL FEATURES (COPPER WEIGHT DEPENDENT) | • Trace: 0.003" (0.0762MM)  • Spacing: 0.003" (0.0762mm)  |
| MATERIALS | • Polyimide - Std. Acrylic  • Polyimide - FR  • Polyimide - AP  • Polyimide - GI  • Silver Epoxy Shielding  • Copper Epoxy Shielding  • Soldermask  • FR-4 / -24, 26 and 28  • LCP  • FEP  |
| COPPER PROCESSING | 1/4 oz. -.400" (10.16mm)  |
| IMPEDANCE SINGLE & DIFFERENTIAL | • ±10%  • ±7.0%  |
| SURFACE FINISHES | • HASL  • Relflowed Tin/Lead  • ODP-Entek 106  • ENIG  • Immersion Tin  • Immersion Silver  • Bright Tin  • Ni/Au  |
| ASSEMBLY CAPABILITIES | • Full Turn-Key  • Thru-Hole - Wave & Manual  • SMT - Pick & Place  • Wire-Bond  • Crimp  • RoHS Compliance  |
| ASSEMBLY FINISHING | • Conformal Coat - UR, Acrylic, Parylene, Fluoropel  • Giop Top  |
| TEST CAPABILITIES | • Overmolding  • Impedance Testing  • Hi-Pot up to 5,000 VDC  • 2,000 + Points per Circuit  • Insulation Resistance up to 1,000 VDC  • Four Wire Kelvin .001 ohm to 1 ohm  • Bed of Nails  • Flying Probe  • Flex Cycling  • Environmental  • Functional Test  |
| CERTIFICATIONS | • IPC 6013 Class I, II & III: Types 1-5  • MIL-P-50884 Types 1-5  • ITAR Registration  • AS9100 Certification  • IPC-601  • UL94VO  • ISO 9001:2000  |

Flex Circuitry used in cStack™ Technology

Flex is a key component of the cStack™ technology used in Amphenol's high speed Gigastack™ and Digastack™ connectors, (see page 35). Amphenol InterCon produces cStack™ flex circuit assemblies that combine low cost termination with high speed, impedance controlled interconnection performance. The patented cStack™ stacking connector* used to terminate these assemblies provides high signal integrity interconnection technology, because of the connector's low (.048 inch) profile between flex and board. Flex circuitry for all cStack™ flex assemblies can be electrically and mechanically customized to exactly fit system specifications.

* US patent number 6,176,707 and 6,217,342. Other patents pending.
Integrated System Packaging
Amphenol is the leading manufacturer of integrated system solutions for the military and aerospace markets. Amphenol Integrated Systems is the synergistic combination of key Amphenol divisions:

- Amphenol Backplane Systems
- Amphenol Printed Circuits
- Amphenol Aerospace Operations Board Level Products
- Amphenol Borisch

We have over 60 years of experience in the military and aerospace market and our commitment to the industry is exemplified in everything we do. We understand the relationship between the interconnect, the printed circuit board, the backplane and the chassis, and we use that knowledge to provide complete solutions.

Amphenol Products - Performance in the Most Demanding Environments
Amphenol can provide system solutions - everything you need inside and outside the box - including products that will perform in harsh environmental conditions: High performance interconnect products, printed circuit boards, backplane assemblies, flex circuitry, heat-sinks and metal enclosures. Amphenol also provides value added assembly including bussing; full system assembly including chassis build and sub-system integration and testing.

Amphenol leads the industry by offering the elements necessary for success in the military and aerospace OEM supply chain:

- Design and Modeling
- Applications Engineering
- Fabrication
- Value-added Assembly
- Test

Coupled with the largest interconnect offering in the market, Amphenol supports all of your system-level needs.

The Engineering Edge
Amphenol Integrated Systems tackles problems such as PWB routing, signal integrity, mechanical robustness, and thermal reliability concurrently rather than independently by value-added applications engineering support. Solving complex packaging challenges depends on making sure that environmental, mechanical, and electrical factors are all addresses at the system-level. By taking this system-level perspective and focusing on these factors, Amphenol Integrated Systems is able to meet your program’s most challenging packaging requirements. We are an extension of your design team, providing expert design and applications engineering assistance every step of the way to ensure program success.

See page 117 for information on Amphenol Backplane Systems capabilities for backplanes and advanced product systems and testing. See also pages 4 & 5 in the introduction section of this catalog for more information on Package Solutions, or call:
Amphenol Aerospace at 800-678-0141,
Amphenol Backplane Systems at 888-318-3553

Above: An example integrated system box that includes the following Amphenol interconnect products:

- Circulars: D38999 cylindrical connectors with MT fiber optics, RJ Field connectors
- Rectangulars: LRM interconnects, NAFI connectors, UHD connectors
- Rectangulars: ARINC 600 connectors, Micro-D Subminiature connectors
- Rectangulars: HDB³ high density brush contact connectors
- Backplane Systems, Flex circuitry, metal enclosure

Other examples of Amphenol Integrated Systems and Enclosures.

See page 117 for information on Amphenol Backplane Systems capabilities for backplanes and advanced product systems and testing. See also pages 4 & 5 in the introduction section of this catalog for more information on Package Solutions, or call:
Amphenol Aerospace at 800-678-0141,
Amphenol Backplane Systems at 888-318-3553
**Quadrax High Speed Contacts for Board Level Interconnects**

**HIGH SPEED QUADRAX, COMPLIANT PIN TERMINATION**

**Quadrax Contacts for Board Level Connectors**
Amphenol supplies size 8 compliant pin Quadrax PCB contacts which provide several advantages for high data transfer rates, low power consumption and excellent EMI compatibility.

- Four strategically spaced inner contacts form two 100 or 150 Ohm matched impedance differential pairs
- Outer contact has rugged wall section for durability
- Same as used in cylindrical 38999 connectors - See Amphenol Combined Circular Connector catalog/PCB contact section for more information on quadrax contacts and cables.

**Suggested Numbering for Quadrax Contacts**

**Quadrax Contacts** are gold plated, crimp termination
Finish of mating contacts parts: supplied with 0.000050 min. gold over nickel on mating parts. Consult Amphenol for availability of other finishes.

**Quadrax Size 8 Contact Performance:**
- Bandwidth: Up to 3 Gigahertz
- Data Rate: Exceeding 3 Gbits/sec.
- Voltage Rating: 500 Vrms max. @ sea level
- Dielectric Withstanding Voltage:
  - 1000 VAC rms between all inner contacts @ sea level
  - 500 VAC rms between inner and outer contacts @ sea level

**4 POSITION BOARD LEVEL CONNECTOR WITH QUADRAX**

**8 POSITION BOARD LEVEL CONNECTOR WITH QUADRAX**

Compliant Pin Quadrax size 8 contacts are available with hole diameters: .025 ±.002 PTH Quadrax contact
.040 ±.003 PTH shell grounding
Accomodates backplane .125 inch min. thickness
(Consult Amphenol Aerospace for availability of additional connector configurations.)

**TYPICAL QUADRAX SOCKET CONTACT** has socket outer contact with a socket inner contact

**TYPICAL QUADRAX PIN CONTACT** has pin outer contact with a pin inner contact

**Board Level Interconnects with Quadrax Contacts**

Contact Amphenol Aerospace for more information at 800-678-0141 • www.amphenol-aerospace.com

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The RADSOK® Design:
RADSOK® technology is based upon a stamped and formed flat grid, uniquely twisted into a hyperbolic geometry to provide robust, high density contact to the mating pin contact. Most pin and socket technologies rely upon spring (beam element) properties of the contact elements, which tend to weaken over time. Unlike most other pin and socket solutions, the RADSOK® also utilizes the tensile strength properties of the flat, high conductivity alloy grid. This provides the high normal forces required for conductivity while also providing large conductive surface area. Correspondingly low voltage drop and low temperature rise are also achieved while maintaining low insertion forces.

RADSOK® Key Features:
• Socket cylinder within female contact has several equally spaced longitudinal beams twisted into a hyperbolic shape
• As male pin in inserted, axial members in the male half deflect, imparting high current flow across the connection with minimal voltage loss.
• The hyperbolic, stamped grid configuration ensures a large, coaxial, face-to-face surface area engagement.
• Ideal for crimp termination applications requiring repeated mating cycles and high current with low milli-volt drop.

RADSOK® Advantages:
• High Reliability
Unique RADSOK® design and construction technology create an electrical contact interface that exceeds typical interconnect requirements. Applications in aerospace, medical, industrial, automotive, mining, offshore, and other harsh environments depend on high reliability of the Amphenol RADSOK® technology.

• Low Contact Engagement/ Separation Forces
The hyperbolic lamella socket contact construction distributes normal forces over a high percentage of the mating pin surface. This creates a smooth, even engagement effort. This force distribution also contributes to excellent performance in vibration applications with resistance to typical fretting corrosion.

• Low Contact Resistance
The large interface area between the socket lamella and pin surface result in very low contact resistance, enabling the RADSOK® contacts' high current ratings compared to traditional power contact designs.

• High Mating Cycle Durability
RADSOK® contacts with typical silver plating finishes have demonstrated survival of 20,000 mating cycles. Specialized plating and contact lubricants can extend cycle life to 200,000 matings or higher. Even with continuous exposure to harsh environmental abuse (salt, sand, and high humidity), RADSOK® contacts have been tested to maintain low contact resistance beyond 10,000 mating cycles.

RADSOK® Technology brings power to the board in a wide variety of applications such as:
• Replacement of ring terminals (lugs) on threaded studs
• High current PCBs
• Communication towers
• Backplane power
• Uninterrupted power supplies
• Fuel cell connectors
• Hybrid electric vehicles
• AC inductive drive motors
• Power distribution modules
• Busbar terminations (plug-in hardware/modules)
• “Pluggable” breakers
• Battery terminals
• Contacts with RADSOK® technology give 50% more ampancy.
• RADSOK® contacts can be designed to fit any housing.
• Combinations of RADSOK® and high speed copper contacts in the same interconnect package

RADSOK® Technology brings high power to Military and Aerospace applications:
• Naval
• Military & Commercial Avionics
• Military Vehicles
• Missiles and Ordnance
• C4I
There are many developing military applications of RADSOK® technology - combinations of RADSOK® and high speed copper contacts in the same interconnect package has become a requirement in rectangular as well as circular connectors.

RADSOK® Derating Chart - Temp. vs. Current
Based on single conductors in free air. Wire cross-section same size as pin contact cross-sectional area.
Amphenol offers high current single-point connections for PC boards with RADSOK® contacts:

- **PowerBlok™**
- **RADSERT™**
- **PGY™**

The compact footprint design of these products can supply up to 120 Amp to the board which preserves surface area and provides more flexibility in board design.

- **PowerBlok** is available in a 3.0mm (70 AMPS) which is press-fit into the PCB
- **RADSERT’s** are available in 2.4mm (35 AMPS) and 3.6mm (70 AMPS). Offered in solder or press-fit styles, and available for many board thicknesses.
- **RADSOK PGY’s** are available in 3.6mm (70 AMPS) and 5.7mm (120 AMPS). Pgy’s are connected to the PDB through a solder reflow process.

**Standard and Custom-Developed Solutions**

- In addition to the various standard sizes of RADSOK® components, custom-developed solutions are also available. Amphenol has the global design, engineering and manufacturing resources to provide RADSOK® sockets pressed into busbars, crimped to cables, assembled into connectors, assembled into customer or Amphenol designed specialized electrical devices, or as stand-alone components. Amphenol also manufactures a full compliment of mating pin contacts for any application.
- Steady-state current capacities for standard RADSOK® products range from 50 amps to over 1000 amps.
- Amphenol connectors with RADSOK® contacts are offered with a variety of positive-locking features that insure and maintain fully-mated connections.
- Sealing (Sealtac™) and high voltage hot break options are available within the RADSOK® itself or within a very wide range of IP rated connector housings to provide environmental protection to the contact area.

**Rectangular Connectors for High Power Applications**

Amphenol’s offers new Power Interconnects for your high power applications featuring RADSOK® technology. This multi-pole family of connectors is designed for 1750 VRMS or 2450 VDC at 400 A continuous.

Design features include:

- Easy to identify shell polarization
- Split-insert construction for ease of assembly of contacts
- Shell to shell bottoming for electrical conductivity/EMI protection
- Customer programmable keying and a latch with snap detent for solid engagement locking
- Also offered in a low profile right angle 90 degree back shell option with over mold capabilities, helping ease the strain of tight fitting applications.
- Offered in standard plating options as well as Durmalon finish*

* Consult Amphenol Aerospace for more information on cadmium alternative, Durmalon finish.
RF High Frequency Contacts Available for LRM Connectors

Amphenol divisions of SV Microwave and Amphenol Aerospace work together to provide connectors with high frequencies. SV Microwave division of Amphenol is a world leader in the design and manufacture of RF/MW connectors and components. They provide high frequency contacts with a unique “Float Mount” technology which allows for consistent microwave performance while maintaining tight mechanical tolerances. These contacts exhibit superior electrical performance and will maintain an accurate phase length when mated.

System design and platform needs have required smaller packaging with RF, D/C signal and power all in close proximity. SV Microwave’s proven designs and blindmate technology have enabled the integration of multiport RF signals into single housings for gang mating capability. For more information, consult SV Microwave.*

SMPM contacts shown on this page are available for use in LRM interconnects (as shown in staggered grid patterns on page 29 in the LRM section of this catalog).

*S V Microwave
Phone: 561-840-1800
Website: www.svmicrowave.com
Cylindrical Interconnects for Printed Circuit Board Attachment

PC TAIL OR COMPLIANT PIN TERMINATION

Cylindrical Connectors with PC Tail Contacts
Amphenol Aerospace is the leader in interconnect systems for aerospace/harsh environment applications. MIL-DTL-38999, MIL-C-26482, MIL-5015 as well as proprietary cylindricals can incorporate pc tail contacts. Jam nut (D hole) or panel mount (four hole) styles are solder mounted to printed circuit boards. PCB contacts are available in sizes 16, 20 and 22D. Considerations must be made for length of PCB tails and any mechanical methods needed to stabilize the board. Commonly used tail diameters and tail stick-out dimensions are given in amphenol's combined Circular Interconnect Catalog/Printed Circuit Board section. PCB contacts are available in coax, twinax, triax and quadrax types. Cylindrical connectors can be attached to boards with flex termination which creates a self-locking terminal pad and eliminates the need for an additional interconnect to the PC board.

Cylindrical Connectors with Flex Circuitry. Flex is designed to geometrically fit the shape of the connector to board package. It is strong and rigid, yet the circuit body is highly flexible.

Cylindrical Connectors on PC Board

Cylindrical Connectors with Compliant Pins
MIL-DTL-38999 connectors can be supplied with compliant pin contacts for solderless mounting on printed circuit boards. Compliant pins engage the plated through holes in the PC board without the need for soldering which provides for high speed, low cost board assembly. They accommodate boards with minimum of 0.090 inch thickness and 0.040 ± 0.003 plated through holes. Both pin and socket contacts are available in any MIL-DTL-38999 Series I, II or III insert pattern having contact size 16, 20 or 22D. Connectors are sold completely assembled or are available fully pre-assembled on a blackplane assembly.


Contact Amphenol Aerospace for more information at 800-678-0141 • www.amphenol-aerospace.com
When you come to Amphenol, you are connected to the broadest range of interconnection products in the marketplace. Amphenol has become the leader in interconnection products through its long history of engineering expertise for product solution solving. The Board Level and Rectangular interconnects shown in this catalog are only a part of the very wide range of interconnects - there is also the whole world of Circulars. Many of the military specifications for cylindrical connectors were developed by Amphenol, formerly Bendix Connector Operations, at the Sidney, NY facility.

Circular Products offered by Amphenol Aerospace include the major mil-spec cylinders and commercial versions, plus many interconnects that meet special applications. Also within the circular interconnect offering from Amphenol, through the Amphenol Industrial Operations division, are many commercial types of connectors.

The following list is a brief overview of Circular Interconnect products offered by Amphenol Aerospace and Amphenol Industrial Operations. There is a vast array of products - many series within Mil-specs, and many options within series.

- MIL-DTL-38999 Series I, II and III
- MIL-DTL-5015 and 5015 types: 97 Series Commercial, GT and ACA-B Reverse Bayonet Connectors
- MIL-DTL-26482, Series I & 2
- MIL-DTL-83723, Series III
- Hermetic Connectors
- Filter Protection Connectors
- Fiber Optic Connectors
- Energy Suppression Connectors
- High Power Connectors including products with RADSOK® high amperage contacts
- Plus a wide range of contacts for circulars:
  - Standard 500 cycle and 1500 cycle, M39029 type power and signal
  - Crimp for front or rear release connector applications
- Solder type fixed contacts
- High frequency shielded coax, triax, twinax contacts
- High-speed quadrax and differential twinax contacts
- Wide range of Accessories for use with Circular Connectors

We invite you to see our Combined Circular Interconnects catalog online at www.amphenol-aerospace.com

Also see the many circular interconnects offered by Amphenol Industrial Operations at www.amphenol-industrial.com.

Contact us at:
Phone: 607-563-5011 or 800-678-0141
Fax: 607-563-5157

The product breadth of Amphenol for Circular Interconnects represents the Amphenol expertise to provide almost any interconnection solution. Amphenol divisions work in synergy to provide our customers with what they need for their specific performance requirements. It is this synergy and team driven effort that has made Amphenol the interconnect technology provider of choice to industry leading companies throughout the world. With a broad and diverse product portfolio, Amphenol is able to develop the right solutions for our customers across the diverse segments of the rapidly expanding electronic market.

**Military/Aerospace Markets - Amphenol Circular Interconnects**
- Military Avionics
- Commercial Avionics
- Military Vehicles
- UAVs
- Missiles/Missiles Defense
- Naval
- C4I
- Space

**Industrial Markets - Amphenol Circular Interconnects**
- Rail/Mass Transit
- Process Control
- Wind & Solar Energy
- Heavy Equipment
- Telecommunications
- Power Generation
- Petro-Chemical

Contact Amphenol Aerospace for more information at 800-678-0141 • www.amphenol-aerospace.com