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The RF Connector Market and its Leading Manufacturers

There were \$1.7 billion radio frequency (RF) connectors sold worldwide in 2006, up 13.3 percent from \$1.5 billion in 2005. By 2010, the RF market will reach \$2.2 billion, achieving a five-year compound annual growth rate of 7.3 percent.

North America has the largest market share, 26.8 percent, of the world RF market, but China will surpass North America by 2010. The following table segments the RF market by geographic region for the years 2005 and 2010.

RF Market by Region

Region	Percent of Market		Change in Market Share
	2005	2010	
North America	26.8%	22.2%	-4.6%
Europe	23.7%	19.8%	-3.9%
Japan	14.8%	13.4%	-1.4%
China	16.6%	25.4%	8.8%
Asia Pacific	11.8%	11.7%	-0.1%
ROW	6.3%	7.5%	1.2%
Total World \$	\$1,522.1	\$2,168.4	

\$ Millions

Over 70 percent of RF connectors are consumed in four market sectors (computers, datacom/telecom, industrial, military). The following table displays RF consumption by market sector.

2006 RF World Consumption by Market Sector

Market Sector	2006	Percent of Market
Computers and Peripherals	\$450.1	26.1%
Telecom/Datacom	\$419.0	24.3%
Industrial	\$243.1	14.1%
Military/Aerospace	\$113.8	6.6%
Total Top Four Sectors	\$1,226.0	71.1%
All Others	\$498.4	28.9%
Total World	\$1,522.1	100.0%

\$ Millions

The manufacturer of quality RF connectors and cable assemblies requires a high degree of focus and specialization. For that reason, many RF connector manufacturers concentrate on RF only, and offer few, or no other, connectors.

As a result of the specialization, an RF connector manufacturer may become a Top 10 RF supplier on the world market, but not be one of the largest connector companies. For example, Rosenberger is ranked #1 in RF, but is ranked #21 on the list of largest connector companies. Huber+Suhner is ranked #3 in RF and #27 worldwide.

The following tables identify the Top 20 RF connector manufacturers, their 2005 RF sales, and their market share.

Ranking of the Top 20 Connector Manufacturers

RF Coax

RF Coax Rank	World Rank	Manufacturer	2005 Sales	Percent Market Share
1	21	Rosenberger	\$210.7	13.85%
2	1	Tyco Electronics	\$174.6	11.47%
3	27	Huber+Suhner	\$170.0	11.17%
4	3	Amphenol	\$156.1	10.26%
5	25	Radiall	\$122.2	8.03%
6	9	Hirose	\$107.6	7.07%
7	46	Corning Inc.	\$57.3	3.77%
8	10	JAE	\$42.7	2.81%
9	41	Telegartner	\$38.0	2.50%
10	22	I-PEX	\$34.2	2.25%
Total Top 10			\$1,113.4	73.18%

\$ Millions

RF Coax Rank	World Rank	Manufacturer	2005 Sales	Percent Market Share
11	2	Molex	\$31.6	2.08%
12	24	DDK	\$29.0	1.91%
13	19	SMK	\$27.6	1.81%
14	8	Foxconn (Hon Hai)	\$19.8	1.30%
15	15	ITT Industries - Cannon	\$18.3	1.20%
16	17	Hosiden	\$12.3	0.81%
17	11	Sumitomo Wiring Systems	\$8.8	0.58%
18	37	Conec Corp.	\$7.6	0.50%
19	38	Honda	\$6.6	0.43%
20	26	Souriau	\$6.4	0.42%
Total 11-20			\$168.0	11.04%
Total Top 20			\$1,281.4	84.22%

\$ Millions

Source: Bishop & Associates, Inc.

The Top 20 RF manufacturers by base of origin: North America = 6; Europe = 5; Japan = 8; Taiwan = 1.

The following describes the product lines of the top 15 companies.

RF Ranking # 1 Rosenberger**World Rank # 21**

Complete in-house production, which guarantees optimum control of manufacturing processes, product quality, and on-time product delivery, is one of the many reasons that Rosenberger is the number one manufacturer of RF connectors and assemblies in the world. Their extensive product offering, highly skilled staff, and global production facilities have allowed this family-owned industrial company, headquartered in Germany, to exceed \$210 million in RF connector sales in 2005. Their market share is almost 14 percent. Founded by Hans Rosenberger in 1958, Rosenberger ranks among the leading technological manufacturers of high-frequency technology products and services today. Their extensive product offering of high-frequency coaxial connectors and calibration kits includes numerous interfaces within the following family sizes: ultra miniature, micro miniature, miniature, standard, and custom and high-voltage. They also offer an array of RF automotive products, including the industry standard Fakra, and have recently joined forces with Leoni Special Cables to provide customers with a single-source for high-quality coaxial cable assemblies. A member of the QLF (Quick Lock Formula®) Alliance, Rosenberger offers both the QMA and QN interface.

RF Ranking # 2 Tyco**World Rank # 1**

Ranked number one in worldwide sales of all interconnect and number two in RF connectors, Tyco Electronics offers one of the broadest overall offerings in RF connectors, accessories, and standard assemblies. Tyco's \$174.6 million in RF connector sales is approximately 11.47 percent of the total RF connector market. Tyco's strength in RF connectors lies not only in their world class manufacturing capabilities and highly-trained technical staff, but also in their ability to integrate some of the early industries' most recognized manufacturers of RF interconnect. Names like Amp, Omni Spectra, Adams Russell, Greenpar RF, and M/A-Com, bring not only name recognition in the RF industry, but also years of solid RF technology and experience. Tyco's product family of RF interconnect includes, standard (large and medium), miniature, subminiature, micro miniature, and ultra-miniature interfaces. Tyco offers products that are complaint or conforming to SCTE, Bellcore, UL, CSA, DESC, and CECC specifications, as well as U.S. and European automotive industry specifications.

RF Ranking # 3 Huber+Suhner**World Rank # 27**

Combining the technological competence of two distinct companies, in 1969 Aktiengesellschaft R+E Huber and Suhner & Co. AG, positioned Huber+Suhner to become one of the leading global suppliers of components in the area of radio frequency. With RF connector sales of approximately \$170 million, Huber+Suhner is ranked third, with 11.17 percent of the market. Huber+Suhner's product offering covers frequency ranges from 200 MHz to 6.5 GHz. Coupling mechanisms include slide, snap- or screw-on, bayonet, quick, snap- or screw-lock and quick-fit. Many interfaces are offered in both 50 and 75 impedance. A founding member of the QLF (Quick Lock Formula®) Alliance, Huber+Suhner offer both the QMA and QN RF series, as well as a waterproof version according to IP68 of the QMA. Huber+Suhner RF products are found in communication, transportation, and industrial applications. In addition to their line of standard industry recognized products, Huber+Suhner's many years of experience in engineering and production of coaxial connectors allows them to design and manufacturer to customer specifications.

RF Ranking # 4 Amphenol Corporation

World Rank # 3

A world leader in the design, manufacture, and supply of RF interconnect products for the automotive, broadband communications, instrumentation, military/aerospace, and wireless infrastructure markets, Amphenol RF is ranked fourth in RF connectors, with sales of approximately \$156.1 million. A division of Amphenol Corporation, Amphenol RF has over 50 years of experience in the RF technology industry. Amphenol RF manufacturing sites, located in China, Taiwan, Mexico, and the United States, employ the most advanced RF manufacturing processes in the industry, providing high quality and short lead-time. Through the use of collaborative engineering between Amphenol RF headquarters in Danbury, CT, and its sister divisions located throughout the world, Amphenol RF provides a 24/7 engineering development environment. Amphenol's family of RF interconnects include: DIN 7/16, 1.0/2.3, and 1.6/5.6, SMA/B/C/P, SSMB, 50 and 75 BNC, MCX/MMCX, C-, F-, G- and N-types, TNC, QMA, QWS, triax, twinax, and Fakra. To support the medical market and other applications that require non-magnetic environments, Amphenol offers non-magnetic SMB, MCX, and MMCX connectors. Amphenol is also a member of the QLF (Quick Lock Formula®) Alliance.

RF Ranking # 5 Radiall

World Rank # 25

With 8.3 percent of the RF connector market, Radiall is ranked fifth in RF connectors, with sales of approximately \$122.2 million. Offering one of the industry's broadest ranges of RF connectors, Radiall RF connectors are used in automotive, military, industrial, medical, and telecom applications. Its RF product offering includes ultra miniature, micro miniature, miniature, standard, special/high voltage, between series adaptors, and automotive connectors. Radiall offers hermetically sealed versions of many styles, as well as non-magnetic coaxial connectors designed specifically for the MRI/medical market. A founding member of the QLF (Quick Lock Formula®) Alliance and a joint developer of the QMA interface, Radiall's range of QMA and QN products include coaxial connectors, adapters, terminators, and protective dust caps.

RF Ranking # 6 Hirose

World Rank # 9

Hirose, a leading supplier of RF connectors to the industrial equipment market, including microwave communications equipment, satellite communication devices and electronic measuring instrumentation, is ranked sixth in RF connectors, with sales of approximately \$107.6 million. Focusing on expansion of their product offering and their global presence, Hirose has made large investments in both production and marketing. In addition to their three Japanese manufacturing subsidiaries, Hirose now also has production facilities in Malaysia, North America, Indonesia, and China, with plans to expand into Europe. Over the last decade, using a proven connector development process that established their engineering center as a research and development base, Hirose has made great strides in expanding their RF product line and the markets they serve. This expansion has allowed Hirose to also become a major supplier of RF interconnect to the automotive, mobile communication, and computer markets. Hirose RF products include 50 and 75 BNC, standard and low-cost SMA, SMP, SSMA, M-, N-, and Q-type, C15 (type 15 for satellite broadcasting), TNC, ultra miniature low profile RF, a variety of RF suitable for mobile applications, and hermetically sealed RF connectors.

RF Ranking # 7 Corning Incorporated

World Rank # 6

Corning Incorporated's RF coaxial connector group comprised of Corning Gilbert and Corning Cabelum is ranked seventh in RF connectors, with sales of approximately \$57.3 million and recognition as the largest manufacturer of connectors for CATV in the world. Corning RF connectors are used in a diversified range of commercial and military applications, including cable TV, radar systems, broadband communication systems, and wireless systems. Corning's comprehensive line of broadband RF coax connectors and microwave connectors include F- and N-types, BNC, TNC, adapters, terminators, and 50 and 75 connectors for CATV.

RF Ranking # 8 JAE

World Rank # 10

Japan Aviation Electronics Industry Limited is a globally oriented supplier of components and systems, with manufacturing facilities strategically located throughout the world. JAE Limited's connector business segment accounts for 76 percent of its total sales and is ranked eighth among manufacturers of RF connectors, with sales of approximately \$42.7 million. Sales and marketing for this segment is supported by JAE Electronics, a wholly owned subsidiary of JAE Limited, that is staffed with experts in connector design and application. Focusing on the needs of the wireless communication market and the industry's trend towards miniaturization and standardization, JAE has developed a low-profile surface-mount coaxial connector with SMB interface and a space-saving right-angle bulkhead mount receptacle. In addition, JAE offers high-frequency (up to 20 GHz) SMA-type connectors, N-type, TNC, BNC, Fakra, and 7/16-type.

RF Ranking # 9 Telegartner

World Rank # 41

Telegartner, with RF connector sales of approximately \$38.0 million, is ranked ninth in RF sales and 41st in worldwide connector sales. One of the oldest and largest RF connector manufacturers in Europe, Telegartner has over 25 years of experience in RF connector manufacturing. Its RF product offering includes BNC, TNC, N-type, SMA/B/C/S, MCX, MCXX, 1.6/5.6, 7/16, between series adaptors, and cable terminators. For wireless LAN applications, Telegartner offers reverse SMA, TNC, and BNC connectors. In addition, Telegartner can produce a wide variety of fully tested RF coaxial assemblies.

RF Ranking # 10 IPEX Co. LTD

World Rank # 22

Headquartered in Tokyo, IPEX Co. LTD is ranked 10th in RF connectors, with sales of approximately \$34.2 million. Focusing on the RF connector for wireless LAN antenna industry, IPEX RF connectors are found on cellular phones, notebook computers, game equipment, flat panel displays, PDAs, and automotive electronic equipment. Its MHF series of micro-coaxial connectors are surface-mountable, with a frequency range of DC up to 6 GHz, and the plug side features its patented solderless "i-Fit" technology for easy cable termination.

RF Ranking # 11 Molex

World Rank # 2

Ranked 11th among RF connector manufacturers, with sales of approximately \$31.6 million, and second in worldwide connector sales, Molex focuses on the design, development, and distribution of innovative solutions. Operating 58 manufacturing facilities in 19 countries, assisted by 25 product design centers in 16 countries, Molex can provide standard RF products, derivatives of standard products, or complete custom RF solutions. Molex offers board-to-board, blind-mate, cable- and panel-style RF connectors, in a variety of interfaces and frequencies. A preferred supplier to the automotive industry, Molex offers over 20 keying-to-mating part options of the automotive standard Fakra connector. Other RF products include SMA/B, SSMB, MMCX, MCX, type F and N, BNC, TNC, DIN 7/16 and 1.0/2.3, QMA, triax, and between series adaptors.

RF Ranking # 12 DDK Ltd.

World Rank # 24

A division of Fujikura America Ltd., a fully owned subsidiary of Fujikura Corporation since 1999, DDK is ranked 12th, with RF connector sales of approximately \$29.0 million. A global connector supplier to the computer, computer peripheral, telecommunication, automotive, and industrial markets, DDK manufactures a broad spectrum of RF connectors. Utilizing manufacturing facilities in Japan, Thailand, and China, and the technical expertise of their worldwide sales force, DDK manufactures MMCX, SMA/B/C, SSMB, N- and T-types, BNC, TNC, RF coaxial connectors for car navigation systems and antenna connections, and 50 coaxial arrestors.

RF Ranking # 13 SMK

World Rank # 19

Operating under a strong company philosophy that commits to the advancement of mankind through the development of the information society, SMK is ranked 13th in RF connectors with sales of \$27.6 million. SMK RF interconnects are found in base-station and wireless LAN systems, mobile electronic toll collection unit systems, mobile phones, and Bluetooth products. SMK's RF product family includes RF selectors, enabling switching between two separate RF lines without re-attaching of connectors, RF distributors for dividing RF signals sent from an antenna into two frequency outputs, RF splitters and boosters, RF converters, and RF cords to connect RF signal video components. In addition, SMK offers SMA, hermetically sealed SMP, SMB, and the industry's first rectangular RF coaxial connector designed for use in automotive applications.

RF Ranking # 14 Foxconn (Hon Hai)

World Rank # 8

Ranked 14th in RF connectors with approximately \$19.8 million in sales, Foxconn, a subsidiary of Hon Hai Precision Industries, is ranked eighth in total connector sales. Founded in 1974 by current Chairman Terry Gou, and headquartered in Taipei, Taiwan, Foxconn is Taiwan's leading electronics company. With manufacturing plants strategically located throughout the world, Foxconn possesses the manufacturing flexibility and diversity to allow their products to be used in a multitude of industries. Its RF product offering includes SMA to MHF, F-type-to-F-type, and SMA-to-TNC cable assemblies.

RF Ranking # 15 ITT Industries – Cannon

World Rank # 15

Cannon Connectors, part of the Electronic Components segment of ITT Industries, Inc, is ranked 15th in both RF connector sales and total connector sales. Their approximately \$18.3 million in RF connector sales is obtained by offering a wide variety of RF connectors for both commercial and military applications. Their product offering includes subminiature precision SMA, SMB, SMC, and SMP connectors, as well as the UK telecommunications standard interface, SMZ (BT-type 43) connectors. They also manufacture micro miniature SSMB, SSMC, and SSIZ, as well as one-, two-, and three-way Fakra connectors. Their CoSMID® series combines a MID (Molded Interconnect Device) with coaxial ports that are suitable for surface mounting or through-hole soldering to a PCB, and can be placed on both sides of the board, optimizing valuable board space. Besides RF connectors, ITT Cannon also offers between-series adapters and coaxial terminators.

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