

Plating properties

RADIALL offers a comprehensive range of in-house electroplating for standard or specific uses and conditions. Plating performance is key in several characteristics of the connector such as: Durability, Wear Behavior, Contact Resistance, Electrical Conductivity, Magnetic Properties, Corrosion Behavior, Solderability, and Appearance. Radiall operates its plating facility since 1977 in compliance with the latest environmental standards.

ENVIRONMENTALLY



Manual plating production line

RADIALL PLATING KNOW-HOW

Available coatings are Copper, Nickel, Nickel phosphorous, Tin, Gold, Palladium, white Bronze, Chromium, and Silver.

Base materials on which we apply coating are Copper alloys, Stainless steel, Ferronickel, Zink die cast, Plastic, Aluminium, Titanium, Molybdenum, Glass Carbon, Optical fibre glass, Ceramic.

Radiall Proprietary Plating

NPGR (Nickel Phosphorous Gold Radiall)

This plating consists of a thin layer of gold on top of a layer of electrolytic nickel-phosphorous. Thanks to the addition of Phosphorous (>10%), the Ni becomes non magnetic and offers a low intermodulation level.

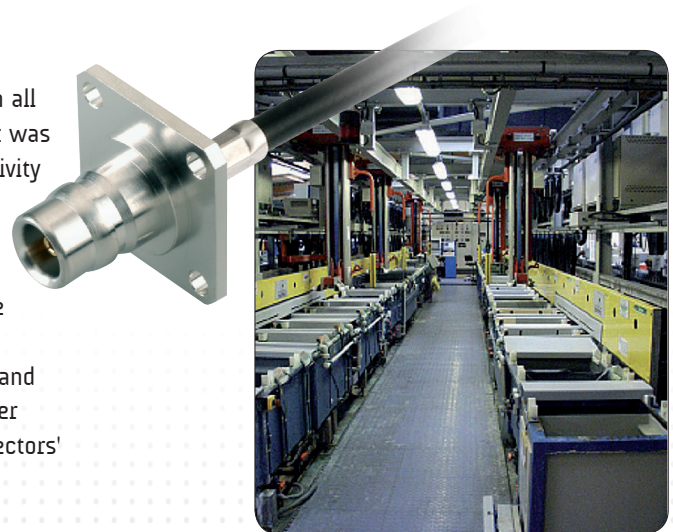
The combination of gold and NiP provides an excellent protection against corrosion, and an ultra low friction coefficient allowing up to 10,000 mating cycles.

The thin gold layer allows a good wettability. NPGR is recommended for center and outer contacts, PCB/SMT connector bodies, and for telecom/datacom applications. It is not recommended however for solder joints in harsh environment, high temperature applications. NPGR is a cost reduction alternative to standard gold plating.

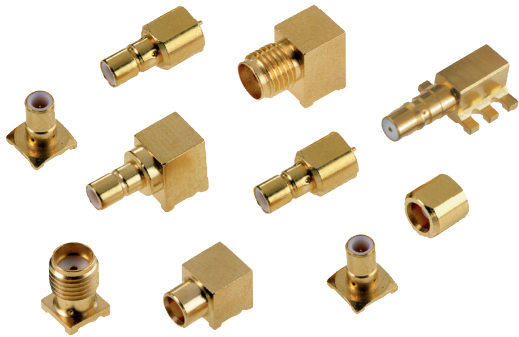
BBR (Bright Bronze Radiall)

BBR is a copper-tin-zinc base alloy plating applicable on all copper substrates which looks like bright white silver. It was designed to replace Ni plating and offers better conductivity while being non allergic and non magnetic.

Intermodulation generated by BBR is as low as that with silver plating. BBR connectors are solderable using mildly activated flux. Corrosion and tarnishing resistance are among the most important environmental features of this plating, together with excellent wearing resistance and mechanical characteristics. BBR is recommended for outer contacts and conductor bodies in cable and panel connectors' applications.



Automatic plating production line



GBR (Gold Bronze Radiall)

This plating is based on our successful BBR with a gold layer which guarantees excellent wettability properties, and with a barrier preventing migration between gold and BBR.

It's an alternative for BBR, with the same basic properties like environmental and wear resistance, mechanical characteristics and very low intermodulation. Improved features are excellent solderability with non activated fluxes, high strength of the soldered joints, good contact resistance.

GBR looks like gold plating, and remains golden through aging and after soldering, thanks to the migration barrier under the gold layer. GBR is recommended for PCB applications where connectors with solder legs or SMT connectors are used.

Standard Plating

GOLD

Gold plating is preferred for its great electrical signal transmission properties. It also provides excellent oxidation resistance even in polluted environment, and mating durability (wear resistant). Gold over copper is mainly used for center and outer contacts with thickness of 0.8 to 2.5µm or more. Gold over Nickel is often used for PCB connector bodies to improve solderability.

NICKEL

This plating has been widely used on connector bodies and outer conductors for its mechanical and environmental properties. But it is often replaced by alternative platings because of the risk of allergy. Now Nickel is commonly used as an underlayer for gold or other noble metals. The Ni layer acts as a diffusion barrier, to prevent the migration of base material atoms (usually copper) to the top coating. But Nickel is magnetic thus not suitable for applications requiring a low IM level. Where Nickel plating is used for PCB connectors with solder legs, it is recommended to choose selective tin plating or hot dipping on the legs before soldering.

SILVER

The main advantage of Silver is its excellent electrical and thermal conductivity, featuring the lowest contact resistance. Silver plated connectors are particularly suitable for applications where low intermodulation is required. It is also recommended for connector parts that need soldering or brazing. Silver plating is often used as a cheaper replacement for gold plating, but Silver tarnishes over time, creating an oxide layer on the surface which affects its electrical properties. Silver is often combined with BBR to avoid tarnishing.

CHROME

Chrome plating can be specified for connectors used in harsh environment for military applications, thanks to its friction, corrosion and wear resistance. But Chrome is toxic, to be handled with care.

Summary table

	Solderability	Electrical performance	Corrosion resistance	Friction, mating durability	IM, magnetic properties	Hardness	Tarnishing	Cost
NPGR (*)	+	++	++	++	+	+	+	+
BBR	-	+	++	+	++	++	++	++
GBR	+	+	++	+	+	+	+	+
Gold / nickel Ni2Au0.2	+	++	++	+	-	+	+	+
Gold / copper Cu2.5Au1.3	+	++	++	+	+	-	+	--
Silver	+	++	+	-	++	--	--	-
Nickel	-	+	++	+	--	+	++	+
Chrome (black/white)	--	-	+++	++	-	+++	++++	+

(*) NPGR is not compatible with Zinc die cast (zamak) parts.