**COAXIAL CONNECTORS** 

# **RF SWITCH connectors**

RADIALE

Coaxial Con

R299.157.800



# **COMPANY PROFILE**



Since 1952, **RADIALL** has specialized in the field of coaxial connectors and cables assemblies. **RADIALL**'s experience and high technology focus, combined with our large worldwide production capability have made the company a major supplier of RF coaxial connectors in the

Head Office - Rosny sous Bois

#### **RESEARCH & DEVELOPMENT**

The ever increasing sophistication of microwave communication systems is continually requiring components to meet a higher level of performance. **RADIALL**'s research and development groups understand these needs and are committed to searching for product solutions that will be needed in the future. They also are providing continued improvements to our already extensive lines of high performance products. All our engineer teams are equipped with state of the art equipment and facilities, in an effort to provide the best



CAD workstation



Numerical control lathe

#### MANUFACTURING

**RADIALL** knows that the quality of the connectors components is directly related to the mechanical precision of the machining process, along with good quality procedures. In an effort to continually meet the highest quality standards, all our production plants are equipped with the latest state of the art production equipment. **RADIALL**'s manufacturing process maintains strict control of all procedures and incorporates all tooling, machining, surface treatment and assembly operations into the manufacturing process of each





Base station of cellular network

#### **HIGH RELIABILITY**

Reliability of inter-connection systems is of the utmost importance in telecommunications applications. This industry need has led **RADIALL** to link high performance design, manufacturing and quality control. This has given the company the capability to produce connectors that will operate in the most stringent environments. The wide range of our product offering allows us to propose the best



Microwave test device



#### **QUALITY ASSURANCE**

**RADIALL**, as a TQM company, continually searches for improvements to the quality process. We operate a Quality Assurance Program that has been developed in accordance with the national and **CECC** agencies (equivalent to **MIL-I-45208** and **MIL-C-45662** standards). This program has enabled us to achieve QPL approval on several of our connector series. **RADIALL**'s Quality Assurance Program operates at all levels of manufacturing from the initial raw incoming material to the final testing procedures just prior to shipping. All test equipment is part of the quality process and is continually inspected on a regular scheduled basis. All production plants in Europe are **AQA P4-NATO** certified.

Certifi	cate of Approval
-	Awarded to
Div	RADIALL
ROS	NY-SOUS-BOIS - VOREPPE - VOIRON FRANCE
Bureau Veritas Qi	uality International certify that the
Quality Manage	ment System of the above supplier
has been assessed	d and found to be in accordance
with the r	requirements of the quality
stan	dards detailed below
	QUALITY STANDARDS
	BS EN ISO 9001: 1994
	SCOPE OF SUPPLY
DESIGN, DEVELOPMENT, PRODUCTIO MANUFACTURIN	N AND SALE OF RADIO FREQUENCY COAXIAL CONNECTORS AND LEADS. NG AND PLATING OF CONNECTION COMPONENTS.
CONCEPTION, DEVELOPPEMENT, PR	ODUCTION ET COMMERCIALISATION DE CONNECTEURS ET CORDONS COAXIAUX HAUTES FREQUENCES. MENT DE SURFACE DE COMPOSANTS POUR CONNECTIQUE.
FORSCHUNG, ENTWICKLUNG, PRO HERSTELLUNG UND OBERFLACT	DUKTION UND VERTRIEB VON HF-STECKVERBINDERN UND-KABELN. HENBEHANDLUNG VON KOMPONENTEN FUR STECKBVERBINDER.
Original approval date	6 March, 1994
Subject to the con Quality Management System	ntinued satisfactory operation of the supplier's 1. this Certificate is valid for a period of three years from:
	27 April, 1997
	an Att
Date 29 May, 1997	Jacques ROY

# **ISO 9001 ACCREDITATION**

This certificate is witness to **RADIALL**'s achievement and commitment to the Total Quality Process. **RADIALL** has always been, since its inception, a company committed to being a Total Quality supplier. Quality is our way of life at

# INTRODUCTION

#### How does it work?

#### Electrical scheme

When the plug is not connected the signal comes from the source, goes through the connector and exits by the internal output (see 1).

When the plug is connected, the signal is diverted and exits through the external output (see (2)) A typical application is switching from an internal antenna to an external antenna.

#### ① Unmated





#### Mechanical scheme



A SPRING TECHNOLOGY has been chosen for the design of those microswitches, which provides ruggedness and reliability (ex. min. 100000 matings for the R-MCX\*) and very good electrical performance up to 6 GHz.

More than 10 Million pieces have already been delivered !

#### **APPLICATIONS:**

- → Mobile phone, PMR/Tetra
- → WLAN, modem : PC MCIA and ISA cards
- Antenna connections
- Test point measurements
- → PC, laptop

#### You have a choice !

Depending on your PCB configuration, you can choose between 2 possibilities :

- Straight RF switches for a connection from the top,
- Edge card RF switches for a connection from the side.

For your convenience, both switches are designed for SMT technology and are compatible with all standard pick and place machines.

Other microswitches can be developed upon request, for other : - Interfaces

- - Custom height
  - Frequency range

Please consult with us.



# CHARACTERISTICS

#### **ELECTRICAL CHARACTERISTICS**

	MC	CARD	R-MCX			
Impedance (Ω)		50	50			
Frequency range	DC -	3 GHz		DC - 6 GHz		
Typical V.S.W.R. unmated mated with plug	900 MHz 1.15 1.04	1800 MHz 1.25 1.02	900 MHz 1.05 1.04	1800 MHz 1.16 1.10	4000 MHz 1.30 1.27	
Typical insertion loss (dB)	0.15	0.22	0.10	0.15	0.25	
Isolation between 2 ways (typical)	-46 dB	-40 dB	-32 dB	-26 dB	-23 dB	
Power	40 W at	935 MHz	60 W at 935 MHz			

#### **MECHANICAL CHARACTERISTICS**

Durability min.	5000	100 000
Engagement force	12 N max	15 N
Separation force	4 N min	slide-on

#### **ENVIRONMENTAL CHARACTERISTICS**

Temperature range	-40, +100°C	-40, +100°C

#### MATERIALS

Bodies	Brass	Brass
Center contact	Beryllium copper	Brass
Outer contact	Beryllium copper	_
Insulator	PEEK 30% GF	PPS

#### PLATINGS

Bodies	Gold	Gold
Center contact	Gold	Gold
Outer contact	Nickel	_





part number	captive center contact	panel	mounting	finish	packaging
R199 005 890W	yes	P02	M01	Gold	unit
R199 005 890	yes	1'02	INO I	Gold	500 / reel

# **COMPATIBLE PLUGS CRIMP TYPE FOR FLEXIBLE CABLES**



Fig. 1





captive center dimensions cable part number fig finish note В contact Α 2/50/S R199 005 200 1 no Nickel straight plug 2,6/50/S R199 005 010 2 Nickel straight plug no 2/50/S R199 005 240 2,57 3 0,96 Nickel right angle plug yes 2,6/50/S R199 005 250 3 3,25 1,63 ves Nickel right angle plug 2,6/50/D R199 005 260 3 3,5 1,63 Nickel right angle plug yes

Fig. 2

# COMPATIBLE PLUGS SOLDER TYPE FOR SEMI RIGID CABLES





<u>ø0.6</u>

cable	part number	fig	captive center contact	finish	note
.085"	R199 005 233 ●	1	no	Gold	straight plug
.085"	R199 005 273 ●	2	yes	Gold	right angle plug

Upon request



For additionnal P/N please consult the MC CARD catalog D1 199 CE.

# **RF SWITCHES**

# **R-MCX SERIES**





INTERNAL OUTPUT

part number	captive center	dimensions		nanel	mounting	finish	nackaging
part number	contact	Α	В	parior	inculting	ministr	paonaging
R299 137 800	yes	6	2,7		M02	Gold	200/reel
R299 137 800W	yes	6	2,7			Gold	unit
R299 137 801	yes	6	2,7	P01		Gold	900/reel
R299 142 821	yes	4,8	1,45	101		Gold	900/reel
R299 142 822	yes	4,8	1,45	]		Gold	100/reel
R299 142 822W	yes	4,8	1,45			Gold	unit

# COMPATIBLE PLUGS CRIMP TYPE FOR FLEXIBLE CABLES





Fig. 2

cable	part number	fig	captive center contact	finish	packaging	note
2 6/50/9	R299 138 000	1	yes	Gold	unit	straight plug
2,0/30/3	R300 113 100	2	yes	Gold	100	right angle plug

# R-MCX / SMA ADAPTER

part number	Designation
R191 977 020	R-MCX female - SMA male
	Test boards available upon request, please contact us



#### SWITCH PACKAGING







## View B for R-MCX switches



## View B for MC CARD switches









#### ACCORDING TO IEC 286-3 STANDARD

MATERIALS

Reel: polyester

Carrier tape : antistatic PETG (polyester)

Cover tape : polyester

#### **PRECAUTION FOR USE**

Automated pick and place machines use standard tooling to peel the antistatic film off. Sometimes the "A" dimension of this tool is shorter than the overall "B" width between the two legs of the receptacle. There is thus a risk for the two legs being deformed while they pass through the tool during the suction operation. The user must then widen the "A" dimension of the peeling tool.



# M 01

Video shadow of receptacle



## Aspiration area



# Receptacle soldering pattern





# M 02

Video shadow of receptacle



# Aspiration area

# **Receptacle soldering pattern**



PCB thickness (mm)	Coplanar line A (mm)
0.8 1.0 1.2	0.183 0.190 0.195
1.6	0.200

Coplanar circuit on PCB PCB material : glass epoxy composite ( $\epsilon$ r= 4.6) Ground and signal are on the same side.



**RF SWITCHES** 

#### To ensure the correct adhesion of the switch to the PCB, the following procedures are recommended.

# A - Soldering procedure using automatic pick and place equipment

1) Solder paste :

• RADIALL recommends using a solder paste Sn62-RP11AGS90 type "no clean - low residue" (5% solid residue of flux quantity) that will permit the elimination of the cleaning operation step after soldering.

• When using a conventional solder paste with high level (50%) of flux solid residue, it is important to incorporate a good cleaning operation step, similar to what is described below in paragraph 5.

• Note : when choosing a solder paste for gold-plated PCB pattern, it is important to use a paste made with silver. This will help in avoiding formation of intermetallics as part of the solder joint.

#### 2) Solder paste deposition :

• The solder paste should be deposited on the designated zone areas (see pattern page 8-9) by a screen printing process. RADIALL advises a thickness of .020" (0.078 mm).

• If using a thickness of less than .020" (0.078 mm) the zone area must be specifically designed for this thickness (please consult RADIALL)

• Please optically verify that the edges of the zone are clean and without contaminates.

#### 3) Placement of the component :

• Place the connector onto the PCB with automatic pick and place equipment. Please verify that the PCB zoned areas have not oxydated.

• RADIALL does not recommend using adhesive agents on the connector or on the PCB

• The use of a video camera is prefered for checking the positioning of the components (see video shadow page 8-9)

#### 4) Soldering : infra-red reflow process :

• Please follow RADIALL's recommended profile as illustrated.

• When using a "no clean - low residue" type of solder paste, RADIALL recommends a linear pre-heat profile not to exceed 160°C with a 1 to 2°C /s. Rise.

#### 5) Cleaning of the PCB :

Switch meets standard requirements like MIL STD 202 F and IEC 68-2-45 concerning connector resistance to solvents. Indeed, the material of switch-beryllium copper-withstands all current solvents such as azeotropic solutions, alcohols, alkaline saponifiers, halogenated hydrocarbons, high temperature water cleaner, CFC substitutes...

• When using a conventional solder paste with high level of residue, please clean the PCB with a substitute product, similar to CFC, that complies to the International Environmental Agency rules.

• RADIALL recommends using a vapor phase process (ultrasonic waves are allowable).

#### 6) Quality Check :

• Verify by visual inspection that contact area of the switch has not been contaminated by solder or flux.

• Solder joints : verify by visual inspection that the formation of meniscus on the sides of the connector leads are proper



#### B - Soldering procedure by manual operation :

#### 1) Solder paste :

- (Refer to procedure A 1)
- 2) Flux deposition :
- Deposite a thin layer of flux on mounting zone.

 Allow the flux to evaporate a few seconds before applying the solder paste (in order to avoid dilution of the paste).

#### 3) Solder paste deposition :

• Deposite a small quantity of solder paste on mounting zone area by syringe.

• Be careful, do not apply solder paste outside of the zone area.

#### 4) Placement of the component :

• Lift the connector by tweezers.

• Place the component on the mounting zone by pressing lightly on the top of the switch with tweezers. The switch leads will stick into the solder paste.

#### 5) Soldering:

• Pre-heat stage : use a heat gun (soldering iron is not recommended) at a distance of .800" (20 mm) from the switch, applying the jet of air in a continuous circular motion, until the solder paste starts to look dull. This stage avoids any thermal shock since both areas to be soldered are brought up to the same temperature.

• Final re-melting step is carried out by moving the heat gun to a closer distance of .200" (5 mm) from the switch legs while guiding the jet of air onto each switch lead, at a 45° angle.

#### 6) Cleaning of the PCB :

- (Refer to procedure A-5)
- 7) Quality check :
- (Refer to procedure A-6)

