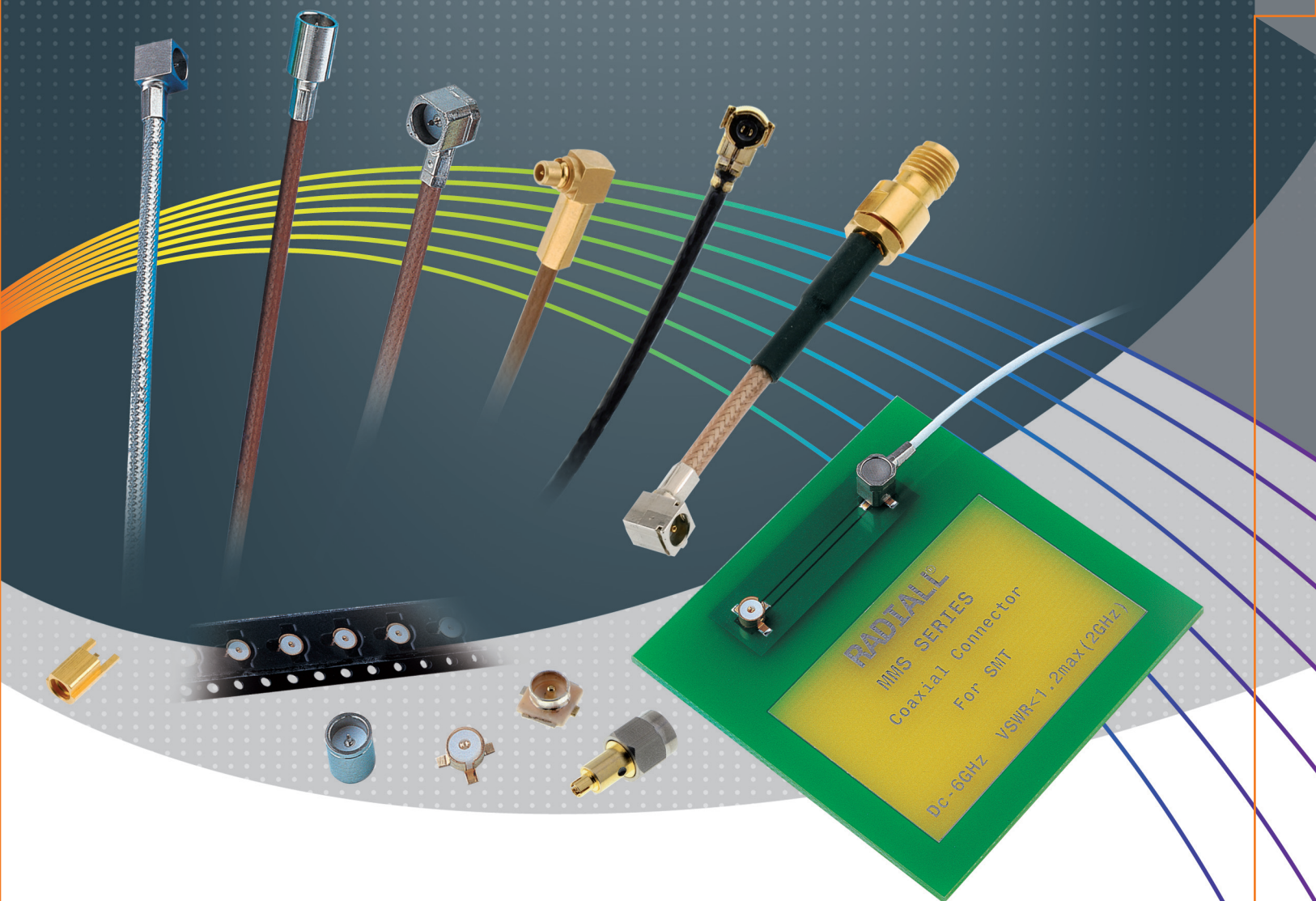




## MMS / MMT / MMCX / MML series

R209 / R210 / R110 / R302

**RADIAL**   
The next connexion



## Pages

### MMS/MMT

|                                |              |
|--------------------------------|--------------|
| Introduction .....             | 2-4 to 2-5   |
| Characteristics .....          | 2-6 to 2-7   |
| Plugs .....                    | 2-8          |
| Cable assemblies .....         | 2-9          |
| Receptacles .....              | 2-9          |
| Accessories and adapters ..... | 2-10 to 2-11 |
| Receptacle packaging .....     | 2-12         |
| Assembly instructions .....    | 2-13         |

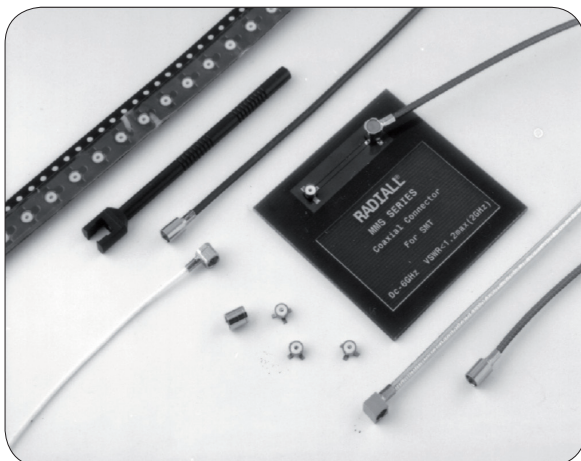
### MMCX

|                                               |              |
|-----------------------------------------------|--------------|
| Introduction .....                            | 2-14         |
| Interface .....                               | 2-14         |
| Characteristics .....                         | 2-15         |
| Plugs .....                                   | 2-16         |
| Receptacles .....                             | 2-16 to 2-17 |
| Receptacle packaging and panel drilling ..... | 2-18         |
| Assembly instructions .....                   | 2-19         |

### MML

|                        |              |
|------------------------|--------------|
| Introduction .....     | 2-20         |
| Characteristics .....  | 2-20         |
| Receptacles .....      | 2-21         |
| Pigtails .....         | 2-21         |
| Cable assemblies ..... | 2-21 to 2-22 |
| Adapters .....         | 2-22         |
| Tools .....            | 2-22         |

# INTRODUCTION



|     | MMS        | MMT        |
|-----|------------|------------|
| 50Ω | DC - 6 GHz | DC - 8 GHz |
| 75Ω | DC - 1 GHz |            |

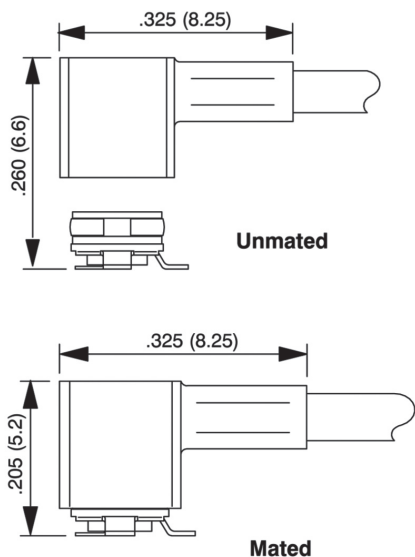
## GENERAL

- Low profile coaxial connectors
- Surface-mount receptacle (SMT)
- Fully compatible with automated pick and place machines
- Snap-on mating
- High RF performance
- 360° cable rotation

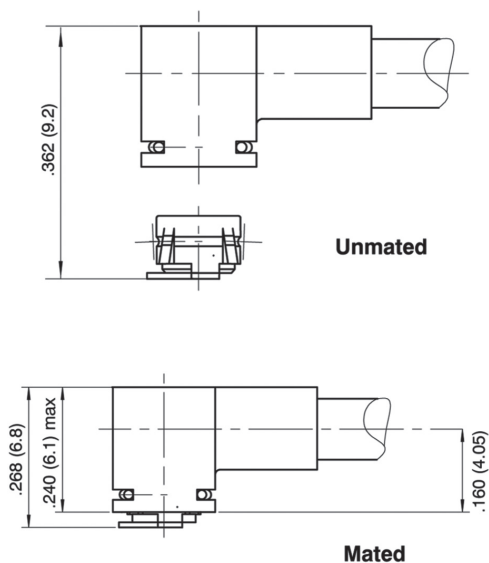
## APPLICATIONS

- Wireless base stations
- Satellite reception terminals (GPS...)
- Instrumentation
- Wireless datacom networks
- Automated payment systems
- Videocommunications
- Other general electronics

### MMS PROFILE



### MMT PROFILE



RADIALl has designed a complete range of microminiature coaxial connectors, dedicated to **Surface Technology (SMT)**.

Better than a simple SMT version of standard connector, **MMS** and **MMT** series were the first coaxial designed for SMT applications. Due to its optimized design, **MMS** and **MMT** range benefit from the following advantages:

- **Design adapted to automatic placement**

The assymetric footprint of the **MMS** and **MMT** connectors allows video micro-positionning using the shadow to analyse its placement.

**MMS** and **MMT** connectors stand on three pliable legs. This design guarantees the receptacle stability placement. It allows it to absorb by elastic bending of the legs, the pressure of the positioning mechanism.

- **A geometry suited to automated picking**

The plain upper surface of **MMS** and **MMT** receptacle facilitates vacuum picking of the component automated distribution system. The geometry allows the use of numerous pneumatic nozzles with various diameters.

- **Optimization of soldering procedure**

**MMS** and **MMT** connectors materials used resist, without damage, the rapid elevation of temperature during the short time of the solder reflow in an infra-red oven.

- **Packaging**

The **MMS** and **MMT** connectors are packaged on tape and reels containing either 100, 500 or 3 000  
The unit cavity geometry is designed for a perfect presentation of the component. The bottom of the cavity  
This hole facilitates the suction of the component, avoiding the adherence effect and allows the use  
of for a push rod.

- **360° cable rotation**

The **MMS** and **MMT** snap-on mating system ensures a correct positive connection each time and all connectors (plugs + receptacles) have a design which allows a 360° rotation of the pair when mated.

- **MMS vs MMT**

**MMS** and **MMT** connectors are dedicated to similar application.

Nevertheless the choice between these to standard will be driven by the following characteristics:

|                              | MMS                          | MMT                          | Comment                                                                                                                                                                                                      |
|------------------------------|------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Durability<br>(mating cycle) | 50                           | 500                          | It is the main difference between these two series.<br>MMS is dedicated to application wich requires only few mating/unmating cycles. MMT provide stronger retention force while allowing more manipulation. |
| Frequency range              | 50Ω DC-6 GHz<br>75Ω DC-1 GHz | 50Ω DC-8 GHz<br>75Ω DC-1 GHz | Both series are fully optimized for either wireless phone frequency range or mobile computing such as bluetooth, Wifi and Wimax.                                                                             |
| Mated height                 | 5.2 mm                       | 6.8 mm                       |                                                                                                                                                                                                              |

# CHARACTERISTICS

|                               | Test standard               | Values/remarks                                          |            |
|-------------------------------|-----------------------------|---------------------------------------------------------|------------|
| ELECTRICAL CHARACTERISTICS    |                             |                                                         |            |
| Impedance                     |                             | 50Ω                                                     | 75Ω        |
| Frequency range               |                             | DC - 6 GHz                                              | DC - 1 GHz |
| Typical V.S.W.R. (mated pair) | IEC 1169-1                  | 1.05 at 1 GHz<br>1.15 at 2.5 GHz<br>1.35 at 6 GHz       |            |
| Insertion loss                | IEC 1169-1                  | 0.2 dB at 2 GHz                                         |            |
| RF leakage (mated pair)       | MIL STD 1344 method 3008    | -50 dB at 500 MHz<br>-45 dB at 1 GHz<br>-40 dB at 2 GHz |            |
| Outer contact resistance      | NF-C 93050 (I = 40 mA peak) | 5 MΩ max                                                |            |
| Center contact resistance     | NF-C 93050 (I = 40 mA peak) | 15 MΩ max                                               |            |
| Insulation resistance         | IEC 1169-1                  | 500 MΩ min (under 250 V RMS)                            |            |
| Working voltage               |                             | 50 V RMS                                                |            |
| Testing voltage (V RMS)       | IEC 1169-1                  | Ø 1 mm: 250 ; Ø 2 mm: 500                               |            |
| Maximum admissible power      |                             | 40 W at 1 GHz / 20°C / V.S.W.R. = 1                     |            |

## MECHANICAL CHARACTERISTICS

|                           |                      |                                                |
|---------------------------|----------------------|------------------------------------------------|
| Durability                | IEC 1169-1           | 50 matings                                     |
| Force to engage           | IEC 1169-1           | 7 N avg                                        |
| Force to disengage        | IEC 1169-1           | 5.5 N avg                                      |
| Shocks (drop test)        | IEC 68-2-27          | 50 g/11 ms ; 3 shocks/axis/way                 |
| Random vibrations         | General Motors spec. | Sine waves 5 to 1000 Hz<br>3 to 30g - 1 H/axis |
| Bumps (mechanical shocks) | IEC 68-2-29          | 25 g/6 ms 1000 bumps/axis/way                  |
| Cable retention force     | IEC 1169-1           | Ø 1 mm: 20 N ; Ø 2 mm: 35 N                    |
| Solderability             | IEC 68-2-54          | Passed                                         |

## ENVIRONMENTAL CHARACTERISTICS

|                   |          |                                                |
|-------------------|----------|------------------------------------------------|
| Temperature range |          | -40°C/+90°C                                    |
| Climatic cycles   | GAM T 13 | 48 H at 70°C - 24 H at 40°C/93% -36 H at -25°C |

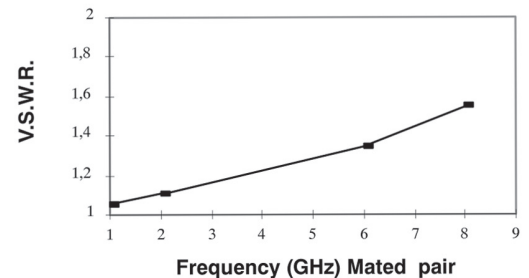
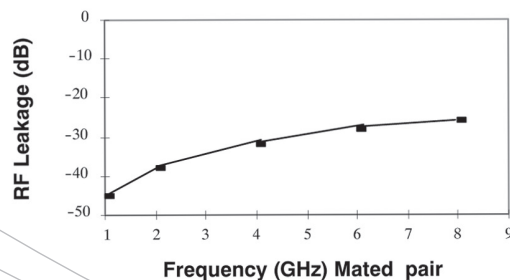
## MATERIALS

|                                 |                     |
|---------------------------------|---------------------|
| Bodies plugs/in-series adapters | Die cast zinc/brass |
| Bodies receptacles              | Phosphor bronze     |
| Center contact male             | Brass               |
| Center contact female           | Beryllium copper    |
| Insulator                       | PTFE                |

## PLATING

|                                 |        |
|---------------------------------|--------|
| Bodies plugs/in series adapters | Nickel |
| Bodies receptacles              | Gold   |
| Center contact male             | Nickel |
| Center contact female           | Gold   |

## RF LEAKAGE AND V.S.W.R



|  | Test standard | Values/remarks |
|--|---------------|----------------|
|--|---------------|----------------|

## ELECTRICAL CHARACTERISTICS

|                               |                           |                                                         |                    |
|-------------------------------|---------------------------|---------------------------------------------------------|--------------------|
| Impedance                     |                           | 50Ω                                                     | 75Ω                |
| Frequency range               |                           | DC - 8 GHz                                              | DC - 1 GHz         |
| Typical V.S.W.R. (mated pair) | IEC 1169-1                | 1.05 at 1 GHz<br>1.10 at 2.5 GHz<br>1.15 at 6 GHz       |                    |
| Insertion loss                | IEC 1169-1                | ≤ 0.2 V F (GHz)                                         |                    |
| RF leakage (mated pair)       | IEC 1726                  | -42 dB at 500 MHz<br>-38 dB at 1 GHz<br>-30 dB at 3 GHz |                    |
| Outer contact resistance      | IEC 1169-1 (I=40 mA eff.) | Initial: 2.5 mΩ max                                     | Final: 12.5 mΩ max |
| Center contact resistance     | IEC 1169-1 (I=40 mA eff.) | Initial: 5 mΩ max                                       | Final: 15 mΩ max   |
| Insulation resistance         | IEC 1169-1                | ≥ 5000 MΩ under 500 Vcc                                 |                    |
| Working voltage               |                           | 170 V eff.                                              |                    |
| Testing voltage               | IEC 1169-1                | 500 V eff.                                              |                    |
| Maximum admissible power      |                           | 23 W at 1.8 GHz / 40°C / V.S.W.R. = 1.1                 |                    |

## MECHANICAL CHARACTERISTICS

|                           |             |                               |
|---------------------------|-------------|-------------------------------|
| Durability                | IEC 1169-1  | 500 matings                   |
| Force to engage/disengage | IEC 1169-1  | Ins ≤ 18 N Ext > 7 N          |
| Shocks                    | IEC 68-2-27 | passed                        |
| Vibrations                | IEC 68-2-6  | passed                        |
| Bumps                     | IEC 68-2-29 | passed                        |
| Cable retention force     | IEC 1169-1  | Ø 2 mm: 20 N ; Ø 2.6 mm: 60 N |
| Solderability             | IEC 68-2-29 | Passed                        |

## ENVIRONMENTAL CHARACTERISTICS

|                   |                       |              |
|-------------------|-----------------------|--------------|
| Temperature range |                       | 55°C / 100°C |
| Damp heat         | IEC 68-23             | Passed       |
| Thermal shocks    | IEC 68-2-14 / Test NA | Passed       |

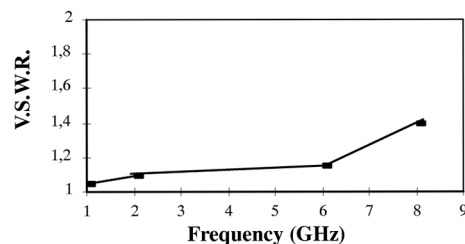
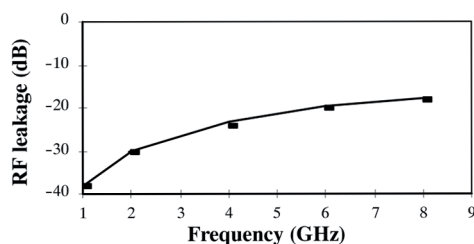
## MATERIALS

|                              |        |
|------------------------------|--------|
| Plugs body/in-series adaptor | Brass  |
| Receptacles body             | CuSn9p |
| Plugs center contact         | Cube2  |
| Receptacles center contact   | Brass  |
| Insulators                   | PTFE   |

## PLATING

|                                 |            |
|---------------------------------|------------|
| Bodies plugs/in series adapters | Nickel/BBR |
| Bodies receptacles              | Gold       |
| Plugs center contact            | Gold       |
| Receptacles center contact      | Gold       |

## RF LEAKAGE AND V.S.W.R



All dimensions are given in mm.

# PLUGS AND PIGTAILS

## STRAIGHT PLUGS CRIMP TYPE FOR FLEXIBLE CABLES

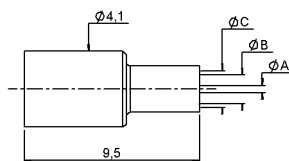
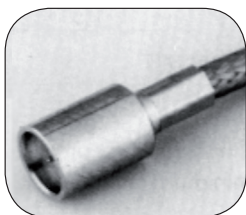


Fig. 1

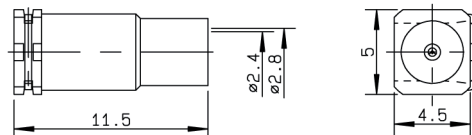


Fig. 2

| Series | Cable group | Cable group dia. | Part number  | Fig. | Imp. (Ω) | Dimensions (mm) |      |      | Captive center contact | Finish |
|--------|-------------|------------------|--------------|------|----------|-----------------|------|------|------------------------|--------|
|        |             |                  |              |      |          | A               | B    | C    |                        |        |
| MMS    | RG178/RG196 | 2/50/S           | R209 080 000 | 1    | 50       | 0.60            | 1.80 | 2.25 | yes                    | nickel |
| MMT    | RG174/RG316 | 2.6/50/S         | R210 087 000 | 2    | 50       |                 |      |      | yes                    | nickel |

## RIGHT ANGLE PLUGS CRIMP TYPE FOR FLEXIBLE CABLES

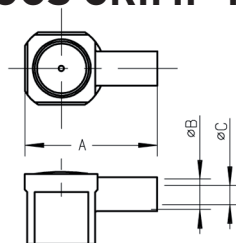


Fig. 1

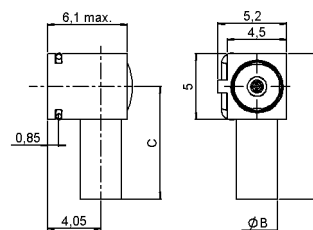


Fig. 2

| Series | Cable group | Cable group dia. | Part number  | Fig. | Imp. (Ω) | Dimensions (mm) |      |      | Captive center contact | Finish |
|--------|-------------|------------------|--------------|------|----------|-----------------|------|------|------------------------|--------|
|        |             |                  |              |      |          | A               | B    | C    |                        |        |
| MMS    |             | 1/50/S           | R209 351 020 | 1    | 50       | 7.15            | 1.28 | 0.65 | yes                    | nickel |
|        | RG178/RG196 | 2/50/S           | R209 353 000 |      |          | 8.25            | 2    | 1.1  |                        |        |
| MMT    | RG178/RG196 | 2/50/S           | R210 160 020 | 2    | 50       | 11              | 3.15 | 8.5  | yes                    | nickel |
|        | RG174/RG316 | 2.6/50/S         | R210 157 010 |      |          | 10              | 3.95 | 7.5  |                        |        |

## PIGTAILS

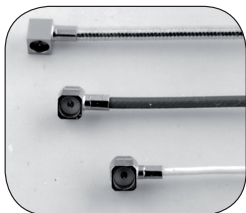


Fig. 1

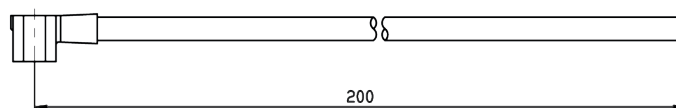
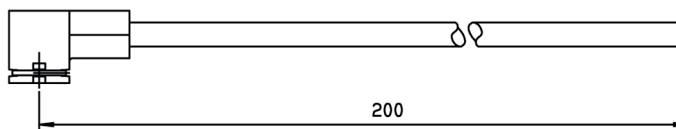


Fig. 2



| Series | Cable group | Cable group dia. | Part number  | Fig. | Composition                 |
|--------|-------------|------------------|--------------|------|-----------------------------|
| MMS    |             | 1/50/S           | R285 001 001 | 1    | R209 351 020 + C291 050 066 |
|        | RG178/RG196 | 2/50/S           | R285 001 021 |      | R209 353 000 + C291 145 007 |
| MMT    | RG178/RG196 | 2/50/S           | R284 008 001 | 2    | R210 160 020 + C291 145 007 |
|        | RG174/RG316 | 2.6/50/S         | R284 008 004 |      | R210 157 010 + C291 150 000 |

To download data sheets and assembly instructions, visit [www.radiall.com](http://www.radiall.com) & enter the part number in the Search box.  
**Bold** part numbers represent products typically in stock & available for immediate shipment.  
 See page 8 and 9 for packaging information.

## CABLE ASSEMBLIES



Fig. 1

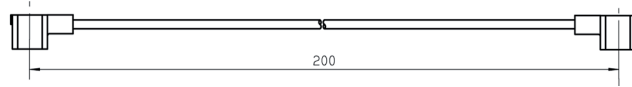
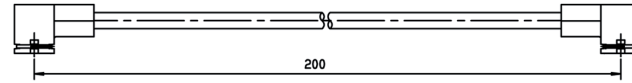
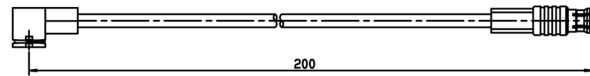
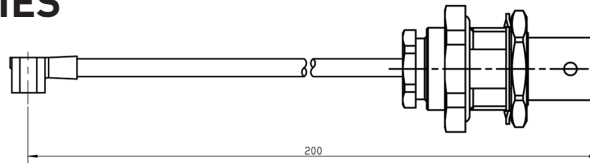
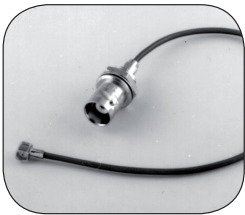


Fig. 2



| Series | Cable group | Cable group dia. | Part number  | Fig. | Composition                                |
|--------|-------------|------------------|--------------|------|--------------------------------------------|
| MMS    |             | 1/50/S           | R285 004 001 | 1    | R209 351 020 + C291 050 066 + R209 351 020 |
|        | RG178/RG196 | 2/50/S           | R285 004 221 | 1    | R209 353 000 + C291 145 007 + R209 353 000 |
| MMT    | RG178/RG196 | 2/50/S           | R285 011 221 | 2    | R210 160 020 + C291 145 007 + R210 160 020 |

## CUSTOM CABLE ASSEMBLIES



Contact us for all your cable assembly needs.

## SMT RECEPTACLES

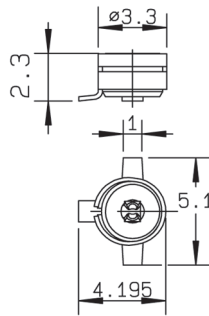
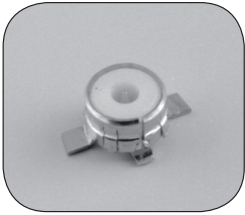


Fig. 1

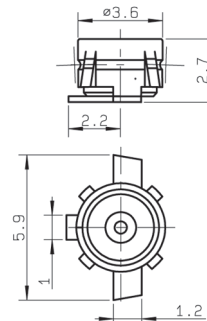


Fig. 2

| Series | Part number  | Fig. | Imp. (Ω) | Center contact finish | Finish | Packaging        | Reel dia. | Assembly instructions |
|--------|--------------|------|----------|-----------------------|--------|------------------|-----------|-----------------------|
| MMS    | R209 408 012 | 1    | 50       | gold                  | gold   | reel 100 pieces  | 180       | M01                   |
|        | R209 408 052 |      |          |                       |        | reel 500 pieces  | 180       |                       |
|        | R209 408 302 |      |          |                       |        | reel 3000 pieces | 330       |                       |
| MMT    | R210 408 012 | 2    |          |                       |        | reel 100 pieces  | 180       |                       |
|        | R210 408 052 |      |          |                       |        | reel 500 pieces  | 180       |                       |
|        | R210 408 302 |      |          |                       |        | reel 3000 pieces | 330       |                       |

To download data sheets and assembly instructions, visit [www.radiall.com](http://www.radiall.com) & enter the part number in the Search box.  
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## TEST BOARD AND ADAPTERS

### BETWEEN SERIES ADAPTERS

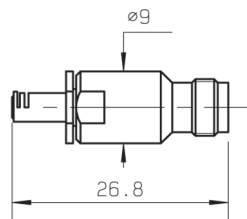
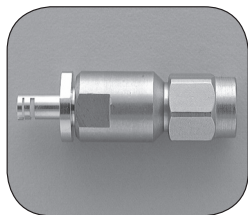


Fig. 1

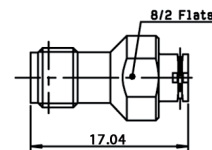


Fig. 2

| Series | Part number  | Fig. | Type                  | Finish                     |
|--------|--------------|------|-----------------------|----------------------------|
| MMS    | R191 975 791 | 1    | MMS female/SMA female | passivated stainless steel |
| MMT    | R191 394 027 | 2    | MMT female/SMA female | BBR                        |

### TEST BOARDS

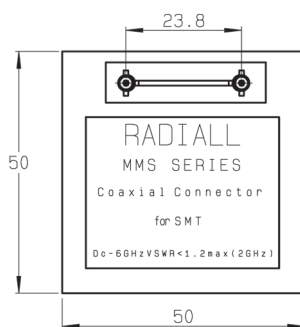
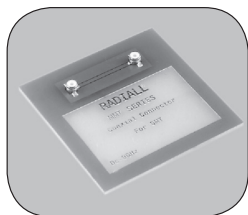


Fig. 1

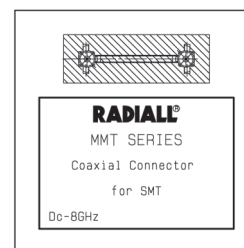


Fig. 2

| Series | Part number  | Fig. |
|--------|--------------|------|
| MMS    | R209 900 500 | 1    |
| MMT    | R210 900 500 | 2    |

Connected to a network analyzer by 2 cable assemblies, this board allows to measure the V.S.W.R. of a complete link.

### IN SERIES ADAPTERS FOR PCB TO PCB LINK

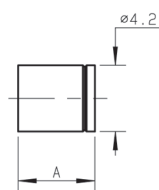


Fig. 1

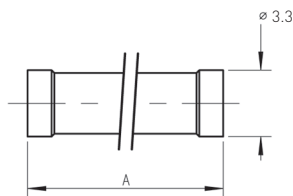


Fig. 2

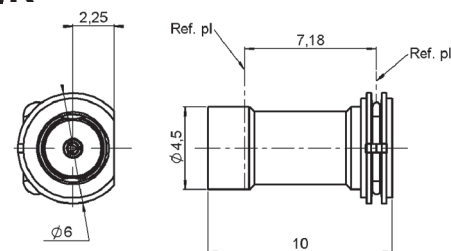
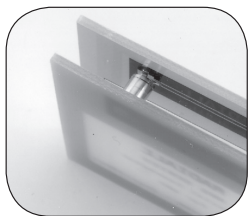


Fig. 3

| Series | Part number  | Fig. | Dimension A (mm) | Finish | Packaging  |
|--------|--------------|------|------------------|--------|------------|
| MMS    | R209 307 000 | 1    | 4.9              | nickel | 100 pieces |
|        | R209 703 070 | 2    | 8.01             |        |            |
| MMT    | R210 703 507 | 3    |                  | BBR    | 100 pieces |

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 See page 8 and 9 for packaging information.



To ease PCB linking, this adapter is designed to remain mated to one designated PCB. Therefore, the slit interface is slide-on, the other is snap-on. This adapter can also be developed upon request with other lengths, in order to adjust space between PCB (minimum distance: 6.4 mm). Please consult us.

## MEASUREMENT CABLE ASSEMBLIES

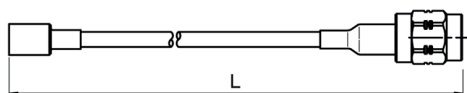


Fig. 1

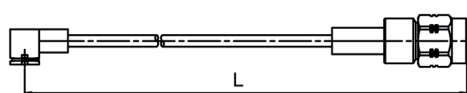
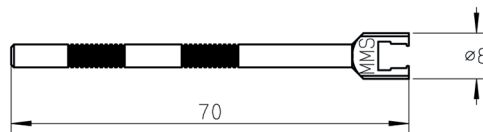
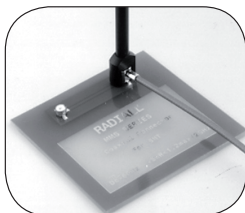


Fig. 2

| Series             | Cable group | Cable group dia. | Part number  | Fig. | Composition                                | Length L (mm) |
|--------------------|-------------|------------------|--------------|------|--------------------------------------------|---------------|
| MMS <sup>(1)</sup> | RG178/RG196 | 2/50/S           | R284 007 013 | 1    | R209 080 500 + C291 145 007 + R124 069 120 | 150           |
| MMT                | RD316       | 2.6/50/D         | R285 024 071 | 2    | R210 158 010 + C291 185 067 + R124 072 220 | 200           |

<sup>(1)</sup> Both cable assemblies are equipped with a straight MMS plug with a sliding interface to allow 500 matings and a SMA connector.

## EXTRACTION TOOL



Materials and finish: black anodized aluminium  
The anodization allows the electric insulation and protects from the oxidization.

| Series | Part number  |
|--------|--------------|
| MMS    | R282 868 100 |
| MMT    | R282 868 030 |

To download data sheets and assembly instructions, visit [www.radiall.com](http://www.radiall.com) & enter the part number in the Search box.  
**Bold** part numbers represent products typically in stock & available for immediate shipment.  
See page 8 and 9 for packaging information.

# RECEPTACLE PACKAGING

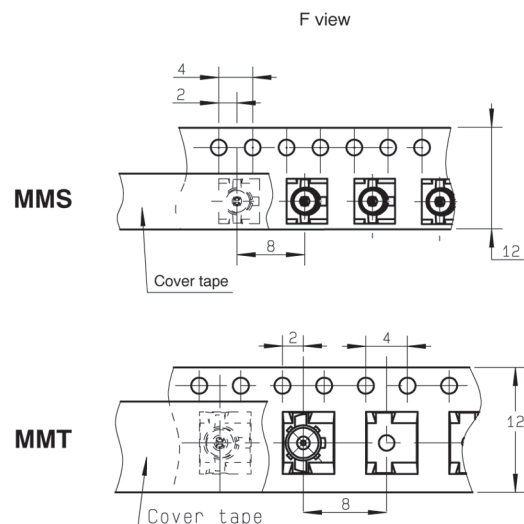
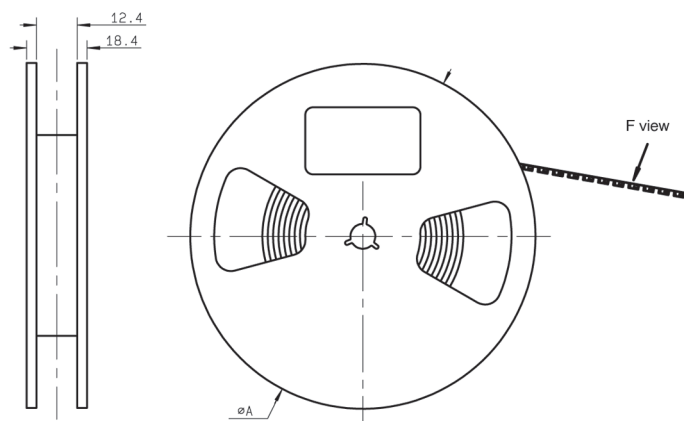
## ACCORDING TO IEC 286-3 STANDARD

### MATERIALS

Reel: polyester

Carrier tape: antistatic PETG (polyester)

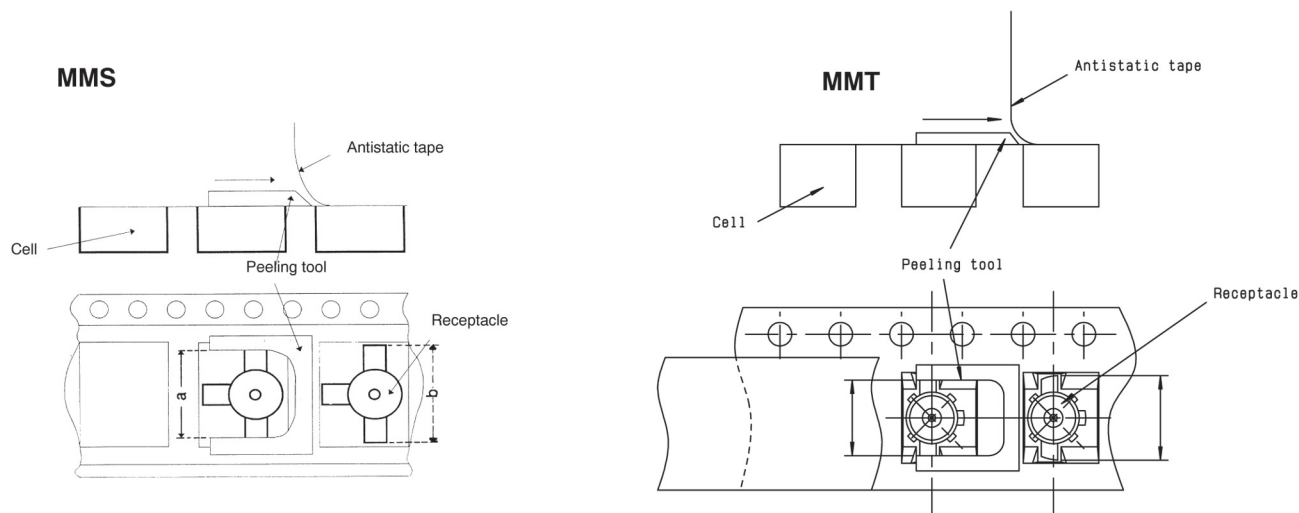
Cover tape: polyester



| Packaging | Dia. A |
|-----------|--------|
| 100 & 500 | 180    |
| 3000      | 330    |

## PRECAUTION FOR USE

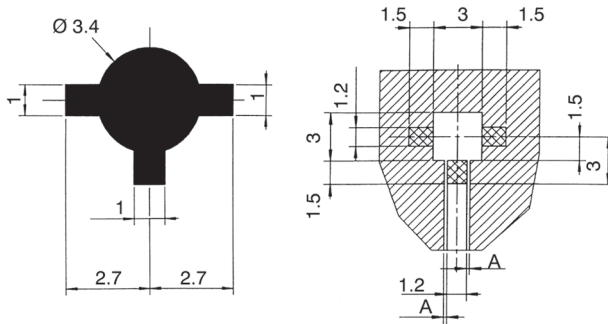
Automated pick and place machines use standard tooling to peel the antistatic film off. Sometimes the "a" dimension of this tool is shorter than the overall "b" width between the two legs of the receptacle. There is thus a risk for the two legs being deformed while they pass through the tool during the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



## M01

### VIDEO SHADOW AND SOLDERING PATTERN OF THE RECEPTACLE

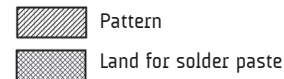
MMS



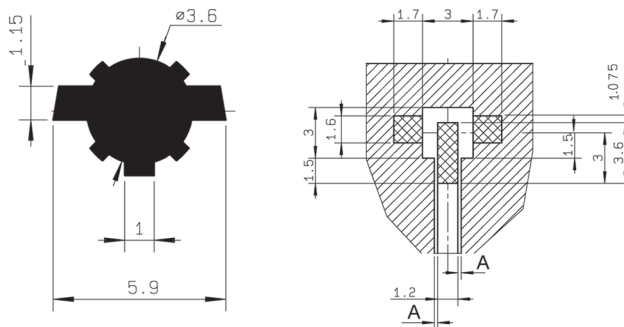
#### Coplanar circuit on PCB

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

| PCB thickness (mm) | Coplanar line A (mm) |
|--------------------|----------------------|
| 0.8                | 0.183                |
| 1.0                | 0.190                |
| 1.2                | 0.195                |
| 1.6                | 0.2                  |



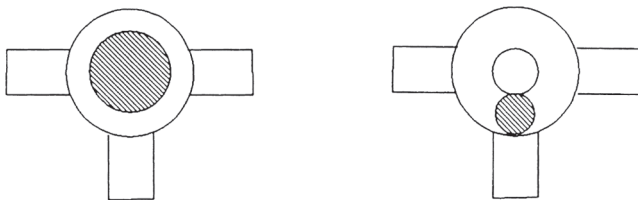
MMT



### SUCTION PROCEDURE FOR RECEPTACLE

MMS

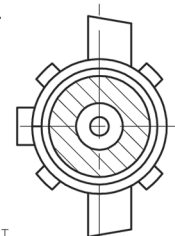
$\varnothing$  OF NOZZLE > 1.2 mm  
Suction with the central contact hole.



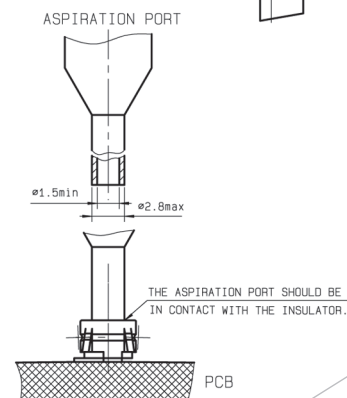
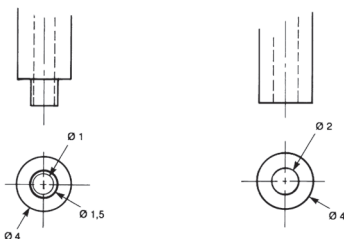
MMT

$\varnothing$  OF NOZZLE < 1.2 mm  
Suction with insulator.

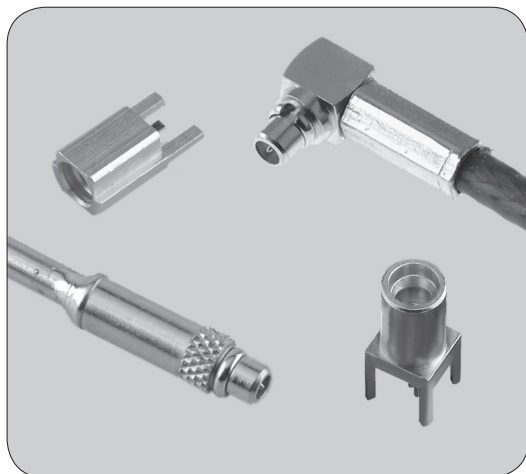
ASPIRATION AREA



### EXAMPLES OF PNEUMATIC NOZZLES



# INTRODUCTION



50 Ω

DC - 6 GHz

## GENERAL

- Subminiature coaxial connectors
- Push-pull" snap-on mating
- Complies with specification CECC 22000

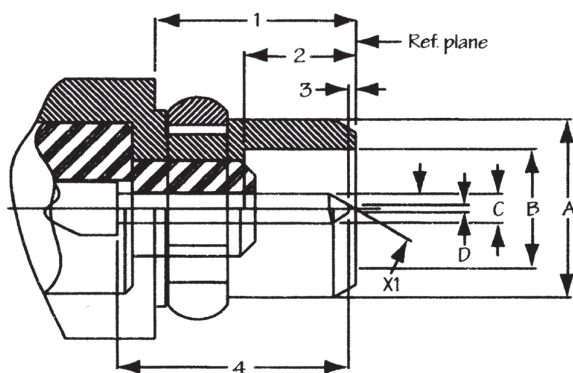
## APPLICATIONS

- Wireless LANs
- PCMCIA cards
- RF test ports
- Base stations

MMCX series from Radiall combine intermatability with CECC 22000 compliant suppliers and high manufacturing quality. MMCX series is especially dedicated to wire to PCB connection where low space above the PCB is available (less than 2.1 mm). Due to Radiall manufacturing quality standard, our MMCX provide positive tactile feedback. MMCX series are adapted to high volume applications and Pick & Place manufacturing process.

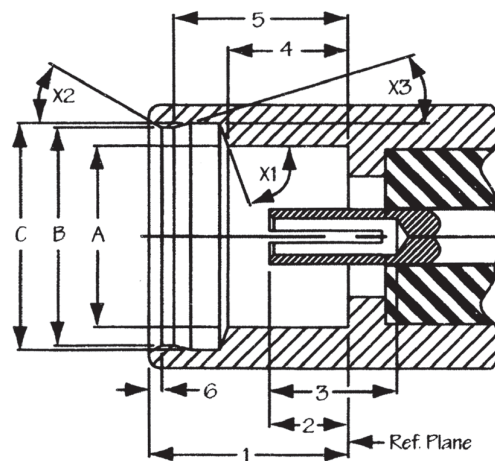
# INTERFACE

## PLUG



| Letter | mm   |      | inch |      |
|--------|------|------|------|------|
|        | min. | max. | min. | max. |
| 1      | 2.70 |      | .106 |      |
| 2      | 1.45 |      | .057 |      |
| 3      | 0    | 0.25 |      | .010 |
| 4      |      | 3.15 |      | .124 |
| A      | 2.40 |      | .095 |      |
| B      | 1.58 | 1.62 | .062 | .064 |
| C      | 0.38 | 0.42 | .015 | .017 |
| D      |      | 0.20 |      | .008 |
| X1     | 29°  | 31°  |      |      |

## JACK



| Letter | mm   |      | inch |      |
|--------|------|------|------|------|
|        | min. | max. | min. | max. |
| 1      | 2.60 |      | .102 |      |
| 2      | 0.90 | 1.20 | .035 | .047 |
| 3      | 1.40 |      | .055 |      |
| 4      | 1.57 | 1.63 | .062 | .064 |
| 5      | 2.30 | 2.34 | .091 | .092 |
| 6      |      | 0.23 |      | .009 |
| A      | 2.41 |      | .095 |      |
| B      | 2.88 | 2.90 | .113 | .114 |
| C      | 3.00 | 3.04 | .118 | .120 |
| X1     | 68°  | 72°  |      |      |
| X2     | 28°  | 32°  |      |      |
| X3     | 13°  | 17°  |      |      |

## CHARACTERISTICS MMCX

MMCX

|                                                | Test standard    | Values/remarks                              |
|------------------------------------------------|------------------|---------------------------------------------|
| <b>ELECTRICAL CHARACTERISTICS</b>              |                  |                                             |
| Impedance                                      |                  | 50Ω                                         |
| Frequency range                                |                  | DC - 6 GHz                                  |
| V.S.W.R.                                       | CECC 22000 4.4.1 | Edge card SMT: 1.40 max<br>Cabled: 1.35 max |
| Dielectric withstanding voltage (at sea level) | CECC 22000 4.4.5 | 500 V RMS 50 Hz                             |
| Insulation resistance                          | CECC 22000 4.4.4 | 1000 MΩ min                                 |

## MECHANICAL CHARACTERISTICS

|                     |                  |                        |
|---------------------|------------------|------------------------|
| Engagement force    | CECC 22000 4.5.4 | 3.5 lbs max            |
| Disengagement force | CECC 22000 4.5.4 | 1.4 lbs to 3.4 lbs max |
| Contact captivation | CECC 22000 4.5.2 | 2.3 lbs min            |
| Durability (mating) | CECC 22000 4.7.1 | 500 cycles min         |

## ENVIRONMENTAL CHARACTERISTICS

|                   |                  |                |
|-------------------|------------------|----------------|
| Temperature range |                  | -55°C / +155°C |
| Temperature shock | CECC 22000 4.6.7 | compliant      |
| Vibration         | CECC 22000 4.6.3 | compliant      |

## MATERIALS AND PLATING

|                                  | Materials                 | Platings |
|----------------------------------|---------------------------|----------|
| Bodies                           | Brass                     | Gold     |
| Center contact<br>male<br>female | Brass<br>Beryllium copper | Gold     |
| Insulator                        | PTFE                      |          |

These characteristics are typical and may not apply to all connectors.

## CHARACTERISTICS Eco MMCX

## ELECTRICAL AND MECHANICAL CHARACTERISTICS

|                   |                   |
|-------------------|-------------------|
| Impedance         | 50Ω               |
| Frequency range   | DC - 3 GHz        |
| Typical VSWR      | 1.35 at 3 GHz     |
| Temperature range | - 40°C / + 85°C   |
| Mating cycles     | 100 mating cycles |

## MATERIALS AND PLATING

|                       | Materials            | Platings |
|-----------------------|----------------------|----------|
| Connector body        | Brass                | Gold     |
| Insulator             | PTFE / Polypropylene |          |
| Female center contact | Beryllium copper     | Gold     |
| Outer contact         | Brass                |          |

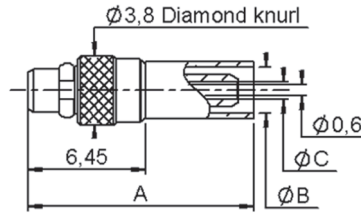
## PACKAGING

|                                |                                                                                                                                                 |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Packaging / MOQ <sup>(1)</sup> | 100 pieces bulk / MOQ 1000 pieces<br>500 pieces reel / MOQ 1000 pieces<br>1500 pieces reel / MOQ 1500 pieces<br>Unit packaging / MOQ 100 pieces |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|

<sup>(1)</sup> MOQ = Minimum Order Quantity

## PLUGS AND RECEPTACLES

## STRAIGHT PLUGS FULL CRIMP TYPE FOR FLEXIBLE CABLE



| Cable group | Cable group dia. | Part number  | Dimensions (mm) |      |      | Packaging |
|-------------|------------------|--------------|-----------------|------|------|-----------|
|             |                  |              | A               | B    | C    |           |
| RG178/RG196 | 2/50/S           | R110 081 020 | 12.45           | 2.55 | 0.97 | 100       |
| RG174/RG176 | 2.6/50/S         | R110 083 120 | 13.35           | 2.95 | 1.61 |           |

## RIGHT ANGLE PLUGS

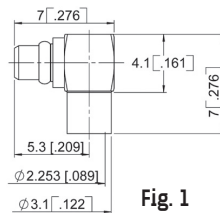
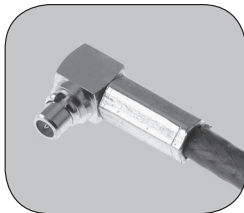


Fig. 1

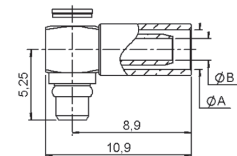


Fig. 2

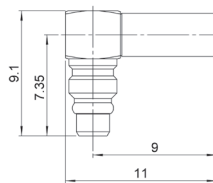


**Fig. 3**

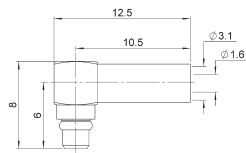


**Fig. 4**

| Cable group | Cable group dia. | Part number   | Fig. | Dimensions (mm) |      | Packaging   | Note        |
|-------------|------------------|---------------|------|-----------------|------|-------------|-------------|
|             |                  |               |      | A               | B    |             |             |
| RG405       | .085"            | R110 153 000  | 1    |                 |      | 100         |             |
| RG178/RG196 | 2/50/S           | R110 170 100  | 2    | 0.97            | 2.55 |             |             |
|             |                  | R110A 170 100 | 3    |                 |      |             | ECO version |
| RG174/RG316 | 2.6/50/S         | R110 172 100  | 2    | 1.63            | 2.95 |             |             |
|             |                  | R110A 172 100 | 4    |                 |      | ECO version |             |

## PCB EDGE CARD RECEPTACLES

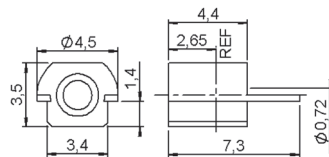


Fig. 1

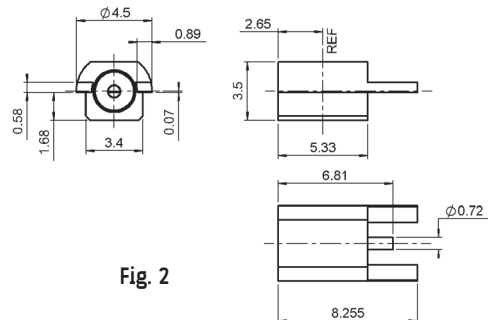


Fig. 2

| Part number   | Fig. | Gende | Assembly instructions | Packaging           | Note        |
|---------------|------|-------|-----------------------|---------------------|-------------|
| R110 422 100  | 1    | Jack  | M04                   | 100                 | SMT         |
| R110 422 200  | 2    |       | M05                   |                     | SMT/offset  |
| R110A 422 830 | 1    |       | M04                   | reel of 1500 pieces | ECO version |

To download data sheets and assembly instructions, visit [www.radiall.com](http://www.radiall.com) & enter the part number in the Search box.  
**Bold** part numbers represent products typically in stock & available for immediate shipment.  
 See page 8 and 9 for packaging information.

## STRAIGHT PCB RECEPTACLES

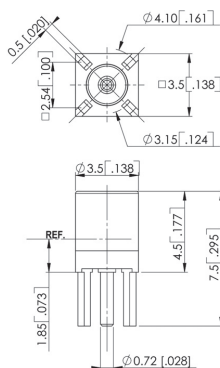
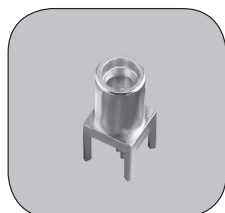


Fig. 1

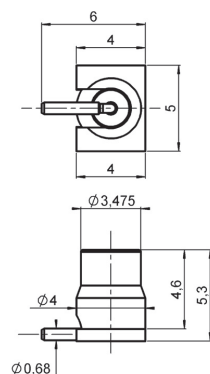


Fig. 2

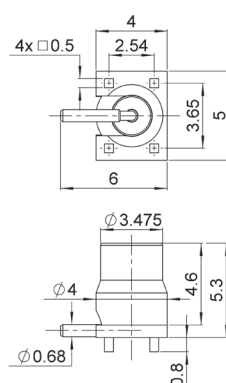


Fig. 3

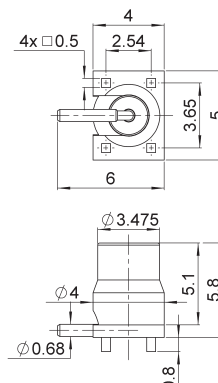
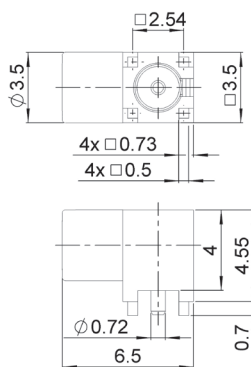


Fig. 4

| Part number   | Fig. | Gender | Panel drilling | Assembly instructions | Packaging          | Note         |
|---------------|------|--------|----------------|-----------------------|--------------------|--------------|
| R110 426 000  | 1    | Jack   | P01            |                       | 100                | solder legs  |
| R110A 426 000 | 1    |        |                |                       |                    | ECO version  |
| R110 426 097  | 1    |        |                |                       |                    | Non magnetic |
| R110 427 820  | 2    |        |                | M02                   | reel of 500 pieces | SMT          |
| R110 427 830  | 3    |        |                |                       |                    |              |
| R110A 427 830 | 4    |        |                |                       |                    | ECO version  |

## RIGHT ANGLE FEMALE RECEPTACLE



| Part number  | Panel drilling | Packaging |
|--------------|----------------|-----------|
| R110 665 860 | P02            | 500       |

# RECEPTACLE PACKAGING

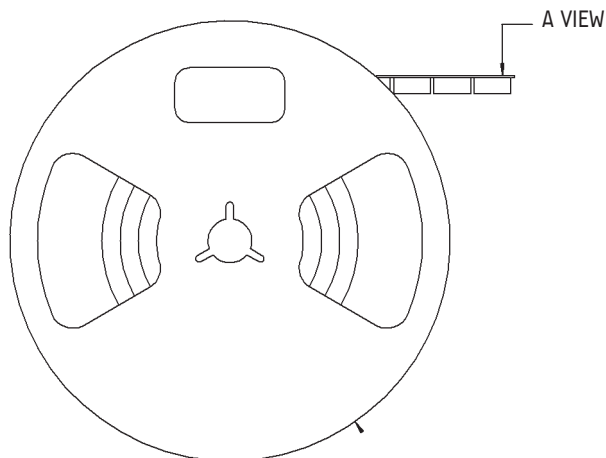
## ACCORDING TO IEC 286-3 STANDARD

### MATERIALS

Reel: polyester

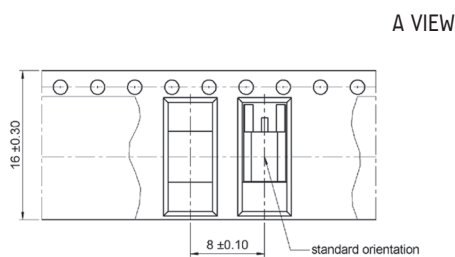
Carrier tape: antistatic PETG (polyester)

Cover tape: polyester



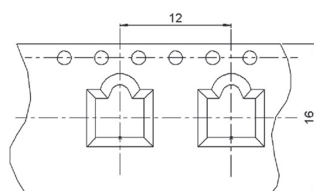
## PRECAUTION FOR USE

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.



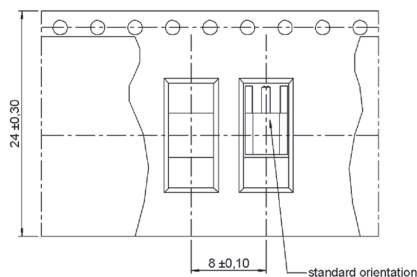
Part number

R110 422 200



Part number

R110 427 820



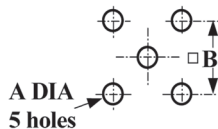
Part number

R110 422 100

R110 422 830

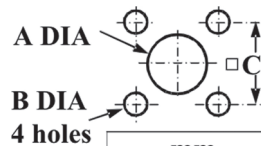
## PANEL DRILLING

### P01



|   | mm   |      | inch |      |
|---|------|------|------|------|
|   | max. | min. | max. | min. |
| A | 0.85 | 0.75 | .033 | .030 |
| B | 2.56 | 2.52 | .101 | .099 |

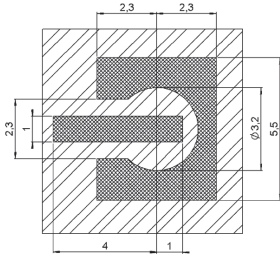
### P02



|   | mm   |      |
|---|------|------|
|   | Maxi | mini |
| A | 1.05 | 0.95 |
| B | 0.9  | 0.8  |
| C | 2.56 | 2.52 |

## M02

### SOLDERING PATTERN



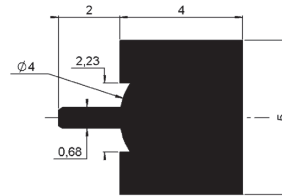
Part number

R110 427 820

Ground + varnish

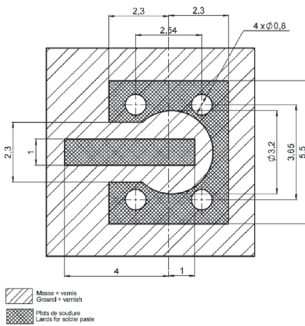
Lands for solder paste

### VIDEO SHADOWS



## M03

### SOLDERING PATTERN

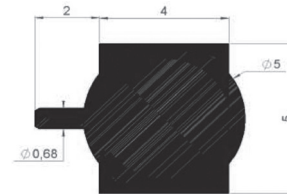


Part number

R110 427 830

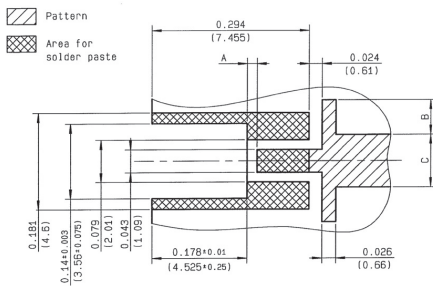
R110A 427 830

### VIDEO SHADOWS



## M04

### SOLDERING PATTERN

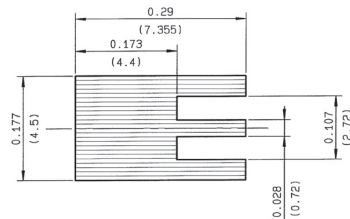


Part number

R110 422 100

R110 422 830

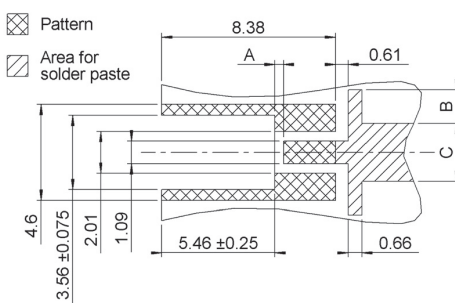
### VIDEO SHADOWS



| PCB THICKNESS | A            | B           | C           |
|---------------|--------------|-------------|-------------|
| 0.031 (0.79)  | 0.039 (0.99) | -           | 0.055 (1.4) |
| 0.039 (0.99)  | 0.035 (0.89) | 0.012 (0.3) | 0.071 (1.8) |
| 0.063 (1.6)   | 0.016 (0.41) | 0.063 (1.6) | 0.11 (2.79) |

## M05

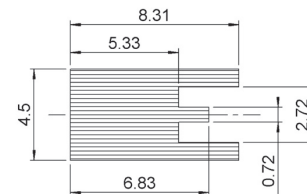
### SOLDERING PATTERN



Part number

R110 422 200

### VIDEO SHADOWS



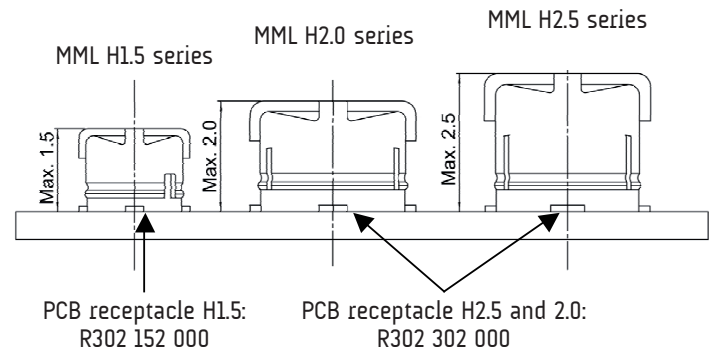
| PCB THICKNESS | A    | B   | C    |
|---------------|------|-----|------|
| 0.79          | 0.99 | -   | 1.4  |
| 0.99          | 0.89 | 0.3 | 1.8  |
| 1.6           | 0.41 | 1.6 | 2.79 |

## INTRODUCTION

RADIALl has developed a new MML series to address the market demand for smaller microminiature coaxial connectors for applications such as cell relay, WiFi access points, GPS and other mobile terminals. There are three types of plugs with mated heights of, H2.5, H2.0 and H1.5, as well as two types of vertical PCB receptacles with good electrical performance up to 6 GHz.

### FEATURES

- Two vertical PCB receptacles
  - MML H2.5 and MML H2.0
  - MML H1.5
- Space saving
  - Three mated heights 2.5 mm, 2.0 mm, 1.5 mm
  - PCB patterns 3.08 mm x 3 mm for H2.5 and H2.0, 2 mm x 2 mm for H1.5
- DC - 6GHz, typical VSWR 1.35 max
- Cable assemblies are offered with three high performance cables: 1.33 mm for MML H2.5, 1.13 mm for MML H2.0, 0.81 mm for MML H1.5



### APPLICATIONS

- Handhelds/GPS/WLAN
- GSM/CDMA/WCDMA/TD-SCDMA cards

## CHARACTERISTICS

Values/remarks

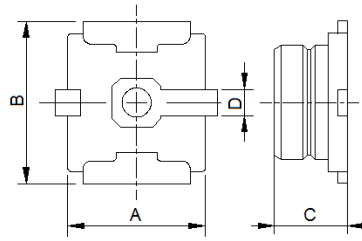
### ELECTRICAL CHARACTERISTICS

|                                                    |                                                     |
|----------------------------------------------------|-----------------------------------------------------|
| Nominal impedance                                  | 50Ω                                                 |
| Frequency range                                    | DC - 6 GHz                                          |
| Typical VSWR                                       | 1.35 max                                            |
| Contact resistance Center contact<br>Outer contact | 25 MΩ<br>15 MΩ                                      |
| Insulation resistance                              | 500 MΩ min                                          |
| Voltage rating H2.5 and H2<br>H1.5                 | 200 Vrms<br>150 Vrms                                |
| Withstanding voltage H2.5 and H2<br>H1.5           | 300 Vrms<br>200 Vrms                                |
| Mechanical durability                              | 30 cycles                                           |
| Center contact axial force                         | 0.15 N                                              |
| RoHS                                               | Compliant                                           |
| Temperature range                                  | -40 / +90°C                                         |
| Humidity                                           | 96 hours at temperature of 40°C and humidity of 95% |
| Corrosion (salt spray)                             | 5% salt water solution, 48 hours                    |

### MATERIALS AND PLATING

|                       | Materials       | Platings |
|-----------------------|-----------------|----------|
| Connector bodies      | Phosphor Bronze | Gold     |
| Female center contact | Phosphor Bronze | Gold     |
| Male center contact   | Brass           | Gold     |

## SMT RECEPTACLES



| MML type    | Part number  | Dimensions (mm) |     |      |     | Packaging       |
|-------------|--------------|-----------------|-----|------|-----|-----------------|
|             |              | A               | B   | C    | D   |                 |
| H2.5 & H2.0 | R302 302 000 | 2.6             | 2.6 | 1.3  | 0.6 | 1000 piece/reel |
| H1.5        | R302 152 000 | 1.7             | 1.7 | 0.85 | 0.3 | 2000 piece/reel |

## MML PIGTAILS

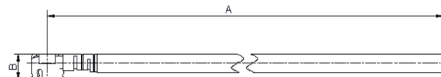


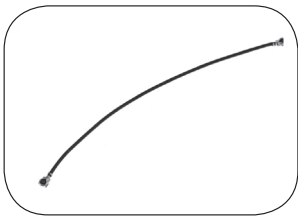
Fig. 1



Fig. 2

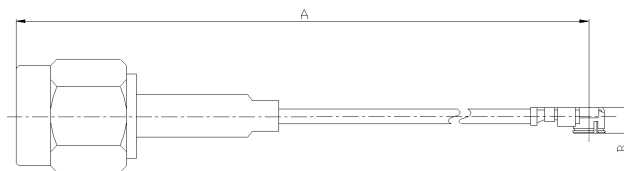
| Cable group dia. | MML type | Part number  | Fig. | Dimensions (mm) |      | Packaging |
|------------------|----------|--------------|------|-----------------|------|-----------|
|                  |          |              |      | A               | B    |           |
| 1.33/50/S        | H2.5     | R302 255 003 | 1    | 200             | 1.95 | 100       |
| 1.13/50/S        | H2.0     | R302 205 001 | 2    |                 | 1.44 |           |
| 0.81/50/S        | H1.5     | R302 155 000 |      | 100             | 1.2  |           |

## MML to MML CABLE ASSEMBLIES



| Cable group dia. | MML type | Part number  | Dimensions (mm) |      | Packaging |
|------------------|----------|--------------|-----------------|------|-----------|
|                  |          |              | A               | B    |           |
| 1.33/50/S        | H2.5     | R302 000 000 | 100             | 1.95 | 100       |
| 1.13/50/S        | H2.0     | R302 205 000 |                 | 1.44 |           |
| 0.81/50/S        | H1.5     | R302 155 001 |                 | 1.2  |           |

## MML to SMA PLUG CABLE ASSEMBLIES



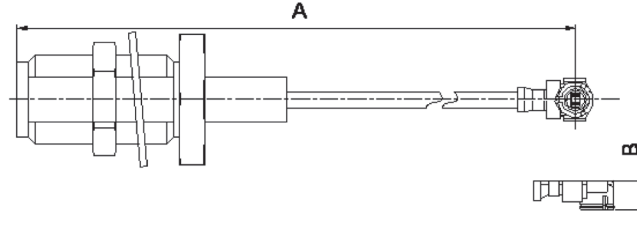
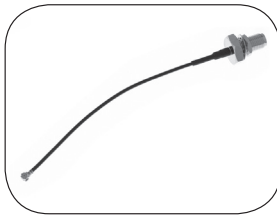
| Cable group dia. | MML type | Part number  | Dimensions (mm) |      | Packaging |
|------------------|----------|--------------|-----------------|------|-----------|
|                  |          |              | A               | B    |           |
| 1.33/50/S        | H2.5     | R302 255 002 | 100             | 1.95 | 100       |
| 1.13/50/S        | H2.0     | R302 205 002 |                 | 1.44 |           |

To download data sheets and assembly instructions, visit [www.radiall.com](http://www.radiall.com) & enter the part number in the Search box.

**Bold** part numbers represent products typically in stock & available for immediate shipment.

See page 8 and 9 for packaging information.

## MML to SMA BULKHEAD JACK CABLE ASSEMBLIES



| Cable group dia. | MML type | Part number  | Dimensions (mm) |      | Packaging | Note             |
|------------------|----------|--------------|-----------------|------|-----------|------------------|
|                  |          |              | A               | B    |           |                  |
| 1.33/50/S        | H2.5     | R302 255 000 | 100             | 1.95 | 100       | Panel sealed SMA |
| 1.33/50/S        | H2.5     | R302 255 001 |                 | 1.95 |           |                  |
| 1.13/50/S        | H2.0     | R302 205 003 |                 | 1.44 |           |                  |

## ADAPTERS

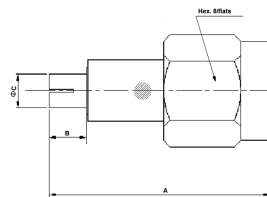


Fig. 1

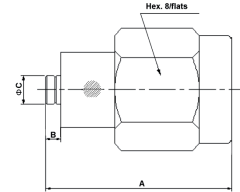


Fig. 2

| MML type    | Part number  | Fig | Dimensions (mm) |      |      | Packaging | Note                |
|-------------|--------------|-----|-----------------|------|------|-----------|---------------------|
|             |              |     | A               | B    | C    |           |                     |
| H2.5 & H2.0 | R302 303 001 | 1   | 17.2            | 2.9  | 2.6  | unit      | MML plug - SMA plug |
|             | R302 303 000 | 2   | 13.2            | 1.05 | 1.98 |           | MML jack - SMA plug |
| H1.5        | R302 153 000 | 1   | 17.2            | 2.9  | 2.1  |           | MML plug - SMA plug |
|             | R302 153 001 | 2   | 12.9            | 0.78 | 1.4  |           | MML jack - SMA plug |

## EXTRACTION TOOLS



| Part number  | To disconnect | Packaging |
|--------------|---------------|-----------|
| R302 309 000 | H2.5 & H2.0   | unit      |
| R302 159 000 | H1.5          |           |

## CABLE CHARACTERISTICS (typical)

| Cable     | Impedance (Ω) | Cable Dimension mm (inch) |                       |                      |                       |                       | Insertion Loss dB/m (dB/ft) |                |                |                |
|-----------|---------------|---------------------------|-----------------------|----------------------|-----------------------|-----------------------|-----------------------------|----------------|----------------|----------------|
|           |               | Core type                 | Core Dia.             | Insulator Dia.       | Screen                | Outer                 | 1 GHz                       | 2 GHz          | 3 GHz          | 6 GHz          |
| 1.33/50/S | 50            | 7*.102<br>(7*.004)        | .305<br>(.012)<br>SPC | .88<br>(.035)<br>FEP | 1.13<br>(.044)<br>TPC | 1.33<br>(.052)<br>FEP | 1.61<br>(0.49)              | 2.33<br>(0.71) | 2.92<br>(0.89) | 4.31<br>(1.31) |
| 1.13/50/S | 50            | 7*.08<br>(7*.003)         | .24<br>(.009)<br>SPC  | .70<br>(.028)<br>FEP | .95<br>(.037)<br>TPC  | 1.13<br>(.044)<br>FEP | 2.00<br>(0.61)              | 2.90<br>(0.88) | 3.70<br>(1.13) | 5.30<br>(1.62) |
| 0.81/50/S | 50            | 7*.05<br>(7*.002)         | .15<br>(.006)<br>SPC  | .41<br>(.016)<br>PFA | .65<br>(.026)<br>TPC  | .81<br>(.032)<br>PFA  | 3.00<br>(0.91)              | 4.40<br>(1.34) | 5.50<br>(1.68) | 8.30<br>(2.53) |

SPC = Silver Plated Copper    TPC = Tin Plated Copper    FEP = Fluorinated Ethylene Propylene    PFA = Perfluoroalkoxy

To download data sheets and assembly instructions, visit [www.radiall.com](http://www.radiall.com) & enter the part number in the Search box.

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