

SUBMINIATURE COAXIAL CONNECTORS

SMA 2.9 series



ISO 9001 APPROVED



COMPANY Profile

Founded in 1952 in France, Radiall started as a family owned company making coaxial plugs. Today, Radiall is an international and global manufacturer of interconnect components including **RF coaxial connectors and cable assemblies, antennas, fiber optic components, microwave components, filter and multipin connectors** for the Automotive, Civil Aviation, Defense, Industrial, Medical, Space and Telecommunications.

Radiall welcomes Applied Engineering Products (AEP) as a new member of its group of companies manufacturer of RF coaxial connectors and cable assemblies



QSE (Quality Safety Environment) POLICY

Radiall maintains a quality management system conforming to international standards, including for environmental protection. Our customers' recognition for the quality of our products and the sustainability of our company, demonstrates the efficiency of our quality system.



CERTIFICATIONS

Certified ISO 9001 since 1994, Radiall has a pro-active policy in terms of conforming to international standards. Today, all Radiall sites are certified to **ISO 9001:2000** and some

dedicated activities are AS9100 or TS 16949. Our process approach gives us the tool for continuous improvement in all our activities.



A major step in our environment policy was the **ISO 14001** certification in 2001 of the Voreppe plant. Radiall complies with European directives such as **RoHS** for hazardous substance restrictions and **EuP** for environmentally friendly designs for energy-using products.

Some Radiall product lines are on **MIL, ESA/SCC** Qualified Product Lists.

Radiall is consequently proud to be recognized by leading industrial customers for the quality of its service and products.



A WORLDWIDE ENGINEERING & MANUFACTURING CAPABILITY

With expertise centers and manufacturing locations in 3 continents. Radiall offers its customers, through 13 industrial sites, the proximity they need to obtain the best quality of service and delivery performance. Our facilities feature state of the art equipment for the many technologies involved in the design, manufacturing and assembly of interconnect products. Manufacturing plants based in **China, India, Tunisia** and **Mexico** give the opportunity to offer Radiall quality at competitive prices.

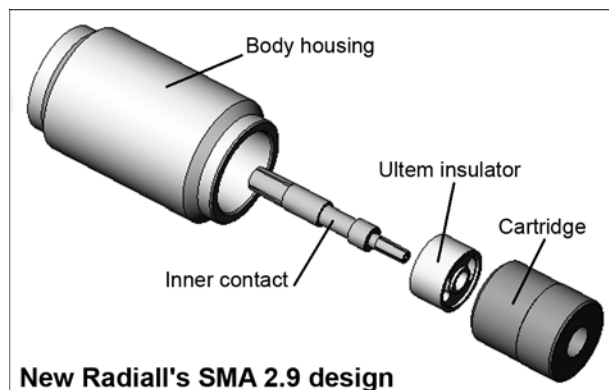
Technical information and sales contacts are available on: www.radiall.com



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This new Radiall's SMA 2.9 range has been designed for field systems up to 40 GHz and replaces our current version of SMA 2.9 products which were mainly dedicated to laboratory test environments. A table with cross references between the new and the previous version is presented page 14.



With a different internal design, the new SMA 2.9 connectors offer the same electrical performances and fit into the same mounting configurations than previous products. They are chemical fluid proof as well as dust ingress protected.

SMA 2.9 series is compatible with K[®] series, 2.92 mm, SMA and SMA 3.5 series and has a shortened male center contact, ensuring a non destructive mating. This new series is specially designed for aeronautics, military equipments as well as instrumentation or telecommunication applications.

SMA 2.9 connectors range includes products for semi-rigid cable, high performance flexible microwave cable assemblies, panel receptacles and in-series adapters.

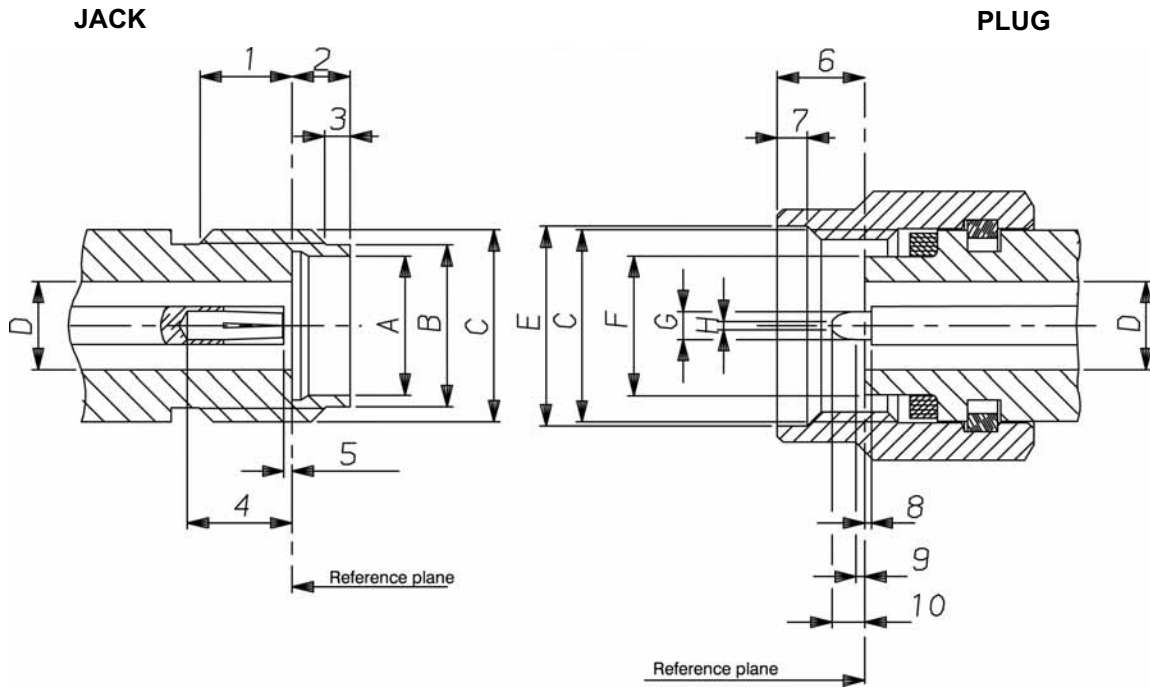
SPACE APPLICATIONS

We also have a complete range for space applications available according to ESA specifications (page 13).

STAINLESS STEEL CONNECTORS (316L ruggedized)

Radiall offers as well a range of cable assemblies equipped with stainless steel connectors for applications in harsh environment. Please consult us.





LETTER or FIGURE	MIN.	MAX.
1	2.87 (.113)	3.27 (.129)
2	1.88 (.074)	1.98 (.078)
3	0.65 (.026)	0.95 (.037)
4	2.40 (.094)	2.68 (.105)
5	-	0.08 (.003)
A	4.60 (.181)	4.63 (.182)
B	5.30 (.209)	5.35 (.211)
C	1/4 - 36 UNS 2A	
D	2.90 (.114)	2.94 (.116)

LETTER or FIGURE	MIN.	MAX.
6	2.63 (.103)	3.25 (.128)
7	0.90 (.035)	1.10 (.043)
8	-	0.08 (.003)
9	0.49 (.019)	0.78 (.031)
10	1.22 (.048)	1.40 (.055)
C	1/4 - 36 UNS 2B	
D	2.90 (.114)	2.94 (.116)
E	6.60 (.260)	6.70 (.264)
F	4.55 (.179)	4.58 (.180)
G	0.92 (.036)	0.94 (.037)
H	0.20 (.008)	0.34 (.013)

All dimensions are given in mm (inches).



ELECTRICAL CHARACTERISTICS

Impedance		50 Ω
Frequency range		DC – 40 GHz
V.S.W.R		< 1.05 + 0.005 F (GHz)
Insertion loss		0.03 √ F (GHz)
RF leakage		– 90 dB max
Insulation resistance		≥ 5000 mΩ
Contact resistance	Outer conductor Inner conductor	≤ 2 mΩ straight ≤ 3 mΩ hermetic ≤ 7 mΩ
Voltage rating		350 V(RMS)
Dielectric withstanding voltage		750 V(RMS)

MECHANICAL CHARACTERISTICS

Mechanical endurance		500 matings
Force to engage and disengage		≤ 23 N cm (2 in/lbs)
Mating torque		80 to 115 N cm (7 to 10 in/lbs)
Coupling nut retention force		≤ 272 N(61 lbf)
Cable retention force		.085" :135 N (30 lbf) .141" : 270 N (60 lbf)
Contact captivation		28N (6.3 lbf)

ENVIRONMENTAL CHARACTERISTICS

Temperature range		– 65°C, + 165°C
Thermal shock		MIL–STD 202 method 107 condition B
High temperature test		MIL–STD 202 method 108
Corrosion (salt spray)		MIL–STD 202 method 101 condition B, 5%
Vibration		MIL–STD 202 method 204 condition D, 20 g
Shock		MIL–STD 202 method 213 condition I, 100 g
Moisture resistance		MIL–STD 202 method 106

MATERIALS

Bodies		Stainless steel
Center contacts		Beryllium copper
Insulators		ultem 1000
Gaskets		Silicone rubber

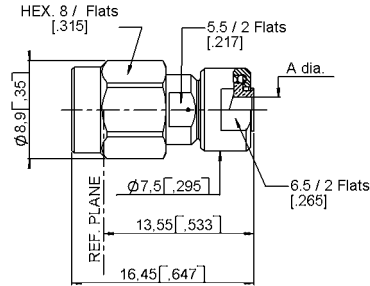
PLATING

Bodies		Passivated
Center contacts		Gold plated

Packaging : unit

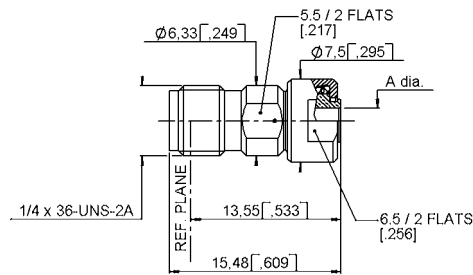


STRAIGHT PLUGS, SOLDER TYPE FOR MICROPOROUS SEMI-RIGID CABLES



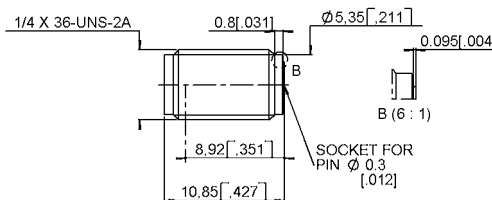
Cable	Part number	Dimension A (mm)	Captive center contact	Assembly instructions
.085" microporous	R127 800 001	2.25	yes	M01
.141" microporous	R127 800 101	3.66	yes	M01

STRAIGHT JACKS, SOLDER TYPE FOR MICROPOROUS SEMI-RIGID CABLES



Cable	Part number	Dimension A (mm)	Captive center contact	Assembly instructions
.085" microporous	R127 820 001	2.25	yes	M01
.141" microporous	R127 820 101	3.66	yes	M01

UNIVERSAL SCREW-ON FEMALE RECEPTACLE



Part number	Assembly instruction	Used with glass bead
R127 841 001	M02	R280 760 040*

*Glass bead: detail on page 9



SQUARE FLANGE FEMALE RECEPTACLES

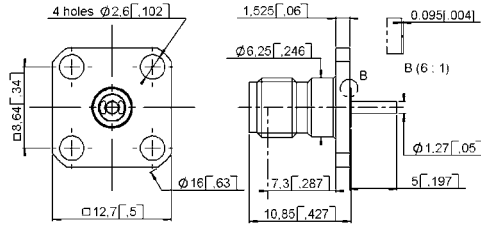


Fig 1

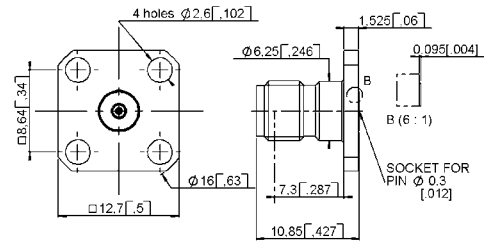
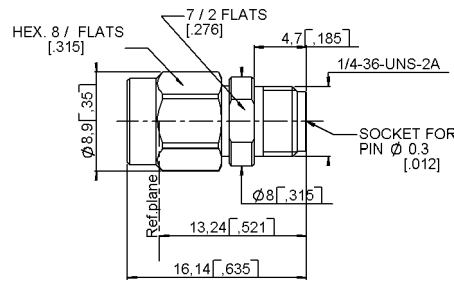


Fig 2

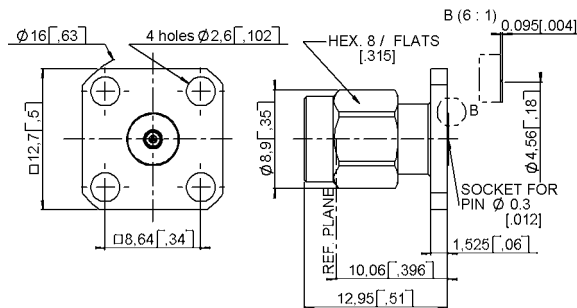
Part number	Fig	Captive center contact	Panel drilling	Use with glass bead	Note
R127 840 021	1	yes	P02	N/A	with cylindrical center contact
R127 842 001	2	yes	P01	R280 760 040*	

SCREW-ON MALE RECEPTACLE



Part number	Captive center contact	Assembly instructions	Used with glass bead
R127 844 001	Yes	M02	R280 760 040*

SQUARE FLANGE MALE RECEPTACLE

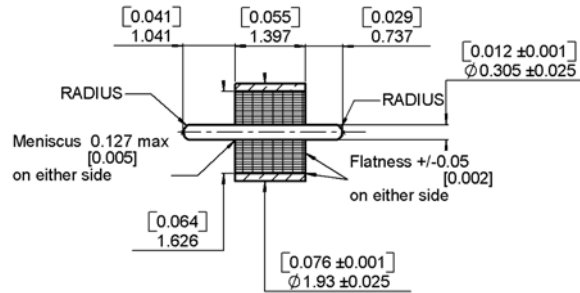


Part number	Captive center contact	Panel drilling	Use with glass bead
R127 845 001	yes	P01	R280 760 040*

* Glass bead: detail on page 9



GLASS BEAD



Part number	Packaging
R280 760 040	100
R280 760 040W	unit

IN SERIES ADAPTERS

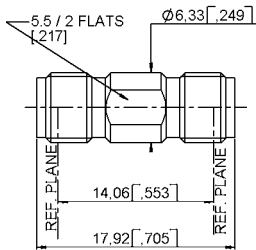


Fig 1

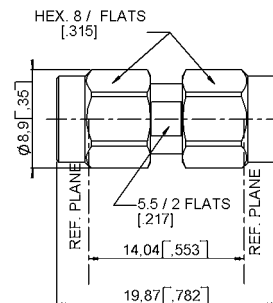


Fig 2

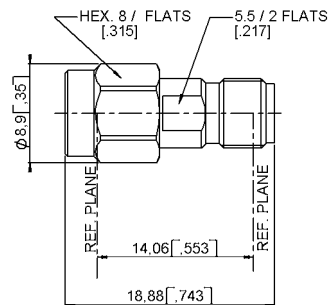


Fig 3

Part number	Fig.	Captive center contact	Note
R127 870 001	1	yes	SMA 2.9 FEMALE - SMA 2.9 FEMALE
R127 871 001	2	yes	SMA 2.9 MALE - SMA 2.9 MALE
R127 872 001	3	yes	SMA 2.9 FEMALE - SMA 2.9 MALE



BETWEEN SERIES ADAPTERS

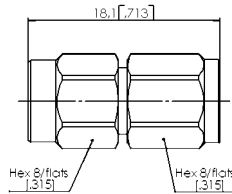


Fig 1

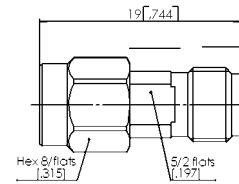


Fig 2

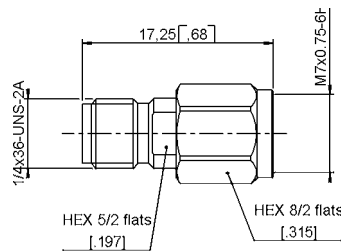


Fig 3

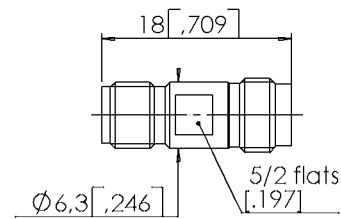


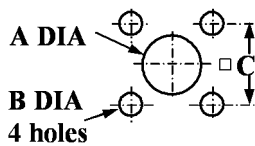
Fig 4

Part number	Fig.	Note
R191 970 061	1	SMA 2.9 MALE - SMA 2.4 MALE
R191 970 071	2	SMA 2.9 MALE - SMA 2.4 FEMALE
R191 970 081	3	SMA 2.9 FEMALE - SMA 2.4 MALE
R191 970 091	4	SMA 2.9 FEMALE - SMA 2.4 FEMALE

Remark: these adapters are still using the previous technology (4 kapton strips) allowing to reach 46 GHz within a temperature range of -65°C / +200°C

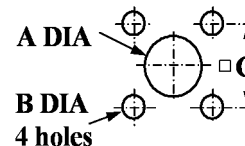
PANEL DRILLING

P01



	mm		Inch	
	Maxi	mini	Maxi	mini
A	1.63	1.60	.064	.063
B	2.70	2.60	.106	.102
C	8.69	8.59	.342	.338

P02



	mm		Inch	
	Maxi	mini	Maxi	mini
A	2.95	2.91	.116	.115
B	2.7	2.6	.106	.102
C	8.69	8.59	.342	.338



COAXIAL FIXED TERMINATIONS

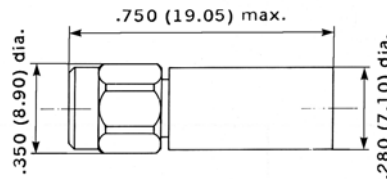


Fig 1

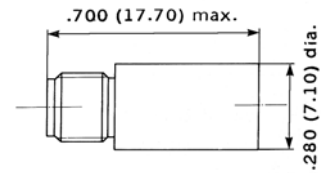
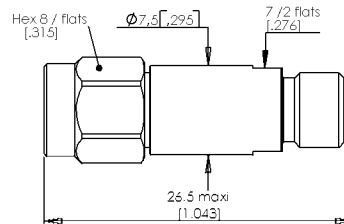


Fig 2

Part number	Fig	Max V.S.W.R.	Power (W)	Note
R404 280 000	1	1.30 up to 40 GHz	0.5	male
R404 285 000	2	1.35 up to 40 GHz	0.5	female

COAXIAL FIXED ATTENUATORS



Part number	Attenuation (dB)	Max V.S.W.R.	Power (W)
R413 300 000	0 ± 0.8	1.60 up to 40 GHz	2
R413 301 000	1 ± 0.8		
R413 302 000	2 ± 0.8		
R413 303 000	3 ± 0.8		
R413 304 000	4 ± 0.8		
R413 305 000	5 ± 0.8		
R413 306 000	6 ± 0.8		
R413 307 000	7 ± 0.8		
R413 308 000	8 ± 0.8		
R413 309 000	9 ± 0.8		
R413 310 000	10 ± 0.8		
R413 320 000	20 ± 0.8		



RAMSES CONCEPT

Due to the "no friction switching" RAMSES concept (**R**Adiall **M**odular **S**ystem for **E**lectromechanical **S**witches), we can guarantee life span up to 10 million for SPDT, long term-reliability, RF characteristics and repeatability.

As a complement to our **40 GHz SMA 2.9** new series, RADIALL offers a full range of microwave switches operating from **DC up to 40 GHz**.



General RF performances

	DC - 18 GHz	18 - 40 GHz		
		for SPDT	for DPDT	for SPnt
V.S.W.R	1.50	1.90	1.90	2.20
Insertion loss (dB)	0.50	0.80	1.00	1.10
Isolation (dB)	60	50	50	50

SPDT switches

	Part number (No option)	Part number (with indicators)	Part number (with TTL Driver)
Failsafe / 28 V*	R570 813 000	R570 823 000	R570 813 100
Latching /28 V*	R570 833 000	R570 843 000	R570 843 100

DPDT switches

	Part number (No option)	Part number (with indicators)	Part number (with TTL Driver)
Failsafe / 28 V*	R577 813 000	R577 823 000	R577 813 100
Latching /28 V*	R577 833 000	R577 843 000	R577 843 100

SP3T to 6T switches

	Part number (No option)	Part number (with indicators)	Part number (with TTL Driver)
Failsafe / 28 V*	R573 813 000	R573 823 000	R573 813 100
Latching /28 V*	R573 833 000	R573 843 000	R573 843 100

*12 Volts available



Space versions are available according to ESA specifications

ESA part number	Radiall part number	Description
ESCC3402021 variant 01	R137 800 001	Straight Plug, solder type, for .085" microporous semi-rigid cables
ESCC3402021 variant 02	R137 800 101	Straight Plug, solder type, for .141" microporous semi-rigid cables
ESCC3402021 variant 06	R137 844 001	Screw Plug receptacle for 0.3mm DIA pin
ESCC3402021 variant 07	R137 845 001	Square flange Plug receptacle for 0.3mm DIA pin
ESCC3402022 variant 01	R137 820 001	Straight Jack, solder type, for .085" microporous semi-rigid cables
ESCC3402022 variant 02	R137 820 101	Straight Jack, solder type, for .141" microporous semi-rigid cables
ESCC3402022 variant 03	R137 841 001	Screw Jack receptacle for 0.3mm DIA pin
ESCC3402022 variant 04	R137 842 001	Square flange jack receptacle for 0.3mm DIA pin
ESCC3402022 variant 05	R137 840 021	Adjustable square flange Jack receptacle with cylindrical contact
ESCC3402023 variant 01	R137 871 001	Straight male – male adapter
ESCC3402023 variant 02	R137 870 001	Straight female – female adapter
ESCC3402023 variant 03	R137 872 001	Straight female – male adapter

Other SMA 2.9 products for Space use:

COAXIAL LOADS	ESCC 3403008	see catalog D1 M100 CE
COAXIAL ATTENUATORS	ESCC 3403009	see catalog D1 M200 CE
COAXIAL 3dB POWER DIVIDERS	ESCC 3404006	please consult us
COXIAL SWITCHES SPDT	ESCC 3603007	see catalog D7 3500 CE
DPDT	ESCC 3603008	see catalog D7 3500 CE
T type	ESCC 3603009	see catalog D7 3700 CE



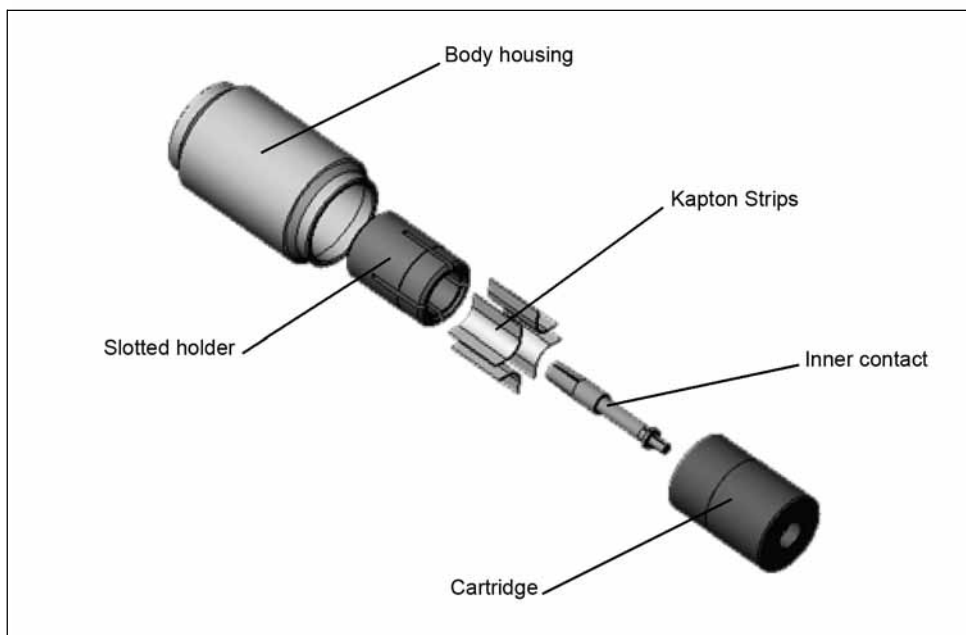
An overview of coaxial products for space use



Please check the cross references table between the previous and the new version.

Part number DC-46 GHz Insulator material : Polyimide	Description	New part number DC-40 GHz Insulator material : Ultem
R127 052 001	Straight plug, solder type for microporous .085" SR cable (captive c.c.)	R127 800 001
R127 055 001	Straight plug, solder type for microporous .116" SR cable (captive c.c.)	
R127 222 001	Straight jack, solder type for microporous .085" SR cable (captive c.c.)	R127 820 001
R127 225 001	Straight jack, solder type for microporous .116" SR cable (captive c.c.)	
R127 601 001	Screw-on, female receptacle (without glass bead)	R127 841 001
R127 631 001	Square flange, female receptacle (without glass bead)	R127 842 001
R127 632 001	2 holes flange female receptacle (without glass bead)	
R127 638 001	Screw-on, male receptacle (without glass bead)	R127 844 001
R127 646 001	Square flange, male receptacle (without glass bead)	R127 845 001
R127 647 001	2 holes flange male receptacle (without glass bead)	
R127 703 001	Straight male - male in-series adapter	R127 871 001
R127 704 001	Straight male - female in-series adapter	R127 872 001
R127 705 001	Straight female - female in-series adapter	R127 870 001
R191 970 061*	SMA 2.9 male - SMA 2.4 male between-series adapter	
R191 970 071*	SMA 2.9 male - SMA 2.4 female between-series adapter	
R191 970 081*	SMA 2.9 female - SMA 2.4 male between-series adapter	
R191 970 091*	SMA 2.9 female - SMA 2.4 female between-series adapter	

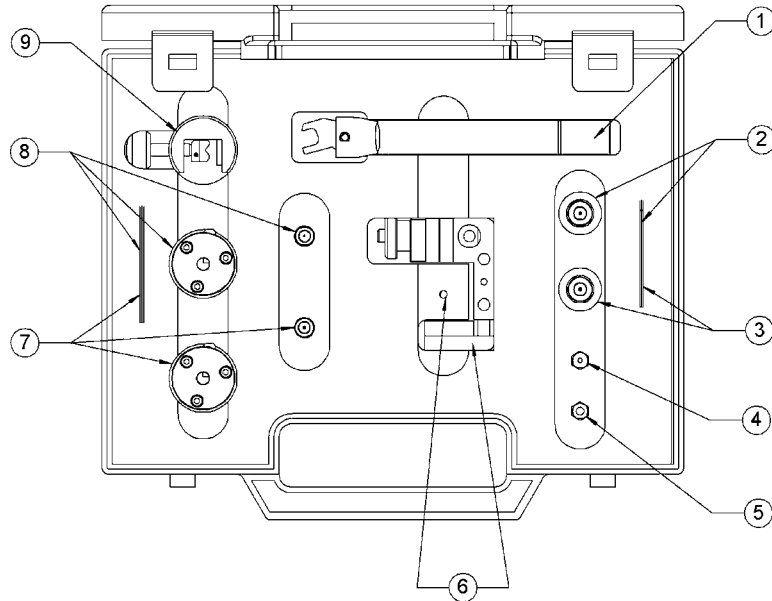
*These 4 products still use the previous technology (4 kapton strips shown in the 3D view below) allowing these adapters to reach 46 GHz, within a temperature range of -65°C/+200°C.



3D view of kapton range



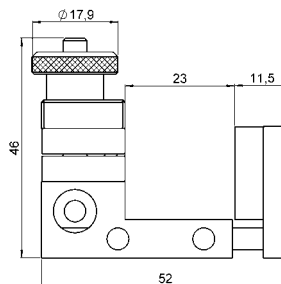
TOOL BOX R282 120 220 FOR MICROPOROUS SEMI-RIGID CABLE



Box dimensions : 230x186 mm

N°	Part number	Designation
1	R282 323 000	Torque wrench
2	R282 061 030	Pointer gauge for cable .085" MP
3	R282 067 030	Pointer gauge for cable .141" MP
4	R282 744 190	Soldering positioner cable .085"
5	R282 744 192	Soldering positioner cable .141"
6	R282 740 000	Soldering mounting
7	R282 053 030	Stripping tool cable .141" MP
8	R282 051 030	Stripping tool cable .085" MP
9	R282 059 010	Cable holder

SOLDERING MOUNTING



Part number
R282 740 000

DYNAMOMETER SCREW DRIVER

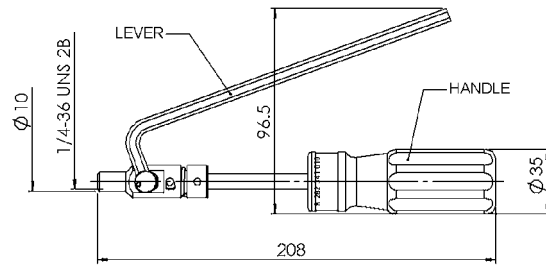
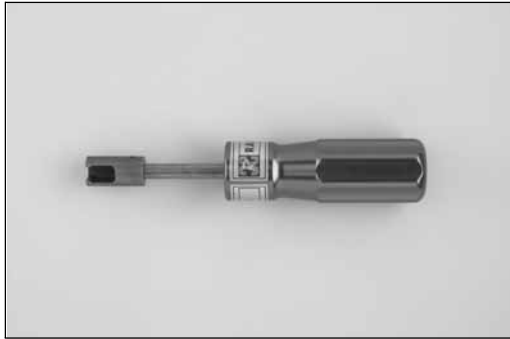


Fig 1

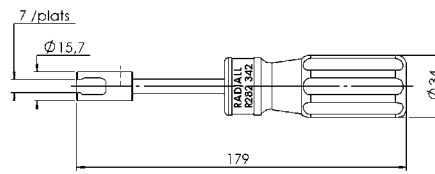
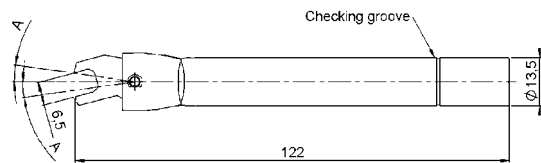


Fig 2

Part number	Fig
R282 341 010	1
R282 342 000	2

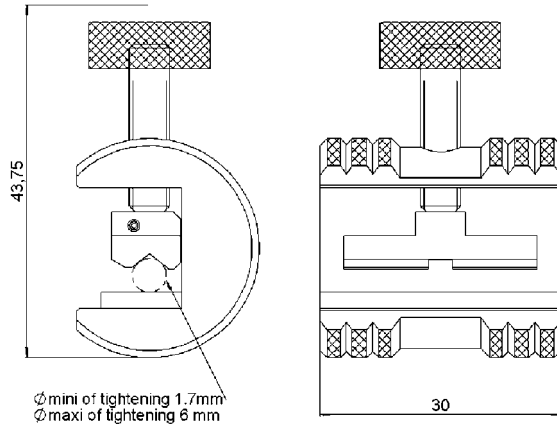
TORQUE WRENCH



Part number	Note
R282 323 000	Coupling torque 100 Ncm ± 20 Ncm AA' angular sweep approximately 8°

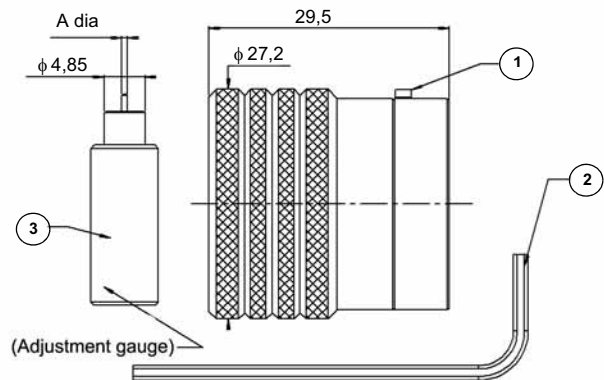


CABLE HOLDER

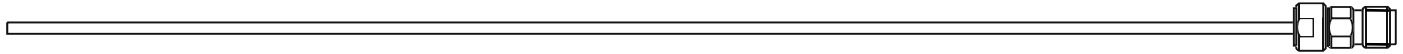


Part number
R282 059 010

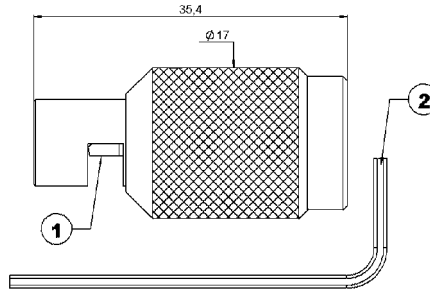
STRIPPING TOOL FOR MICROPOROUS SEMI-RIGID CABLE



Part number	Cable	A dia.	Description
R282 051 030	.085" microporous	0.69	1 R282 055 000 Replacement stripping blade
			2 R282 344 150 1.5 mm across flats male hex key
R282 053 030	.141" microporous	1.15	3 R282 864 112 Replacement adjustment gauge



POINTER GAUGE FOR MICROPOROUS SEMI-RIGID CABLE



Part number	Cable	Stripping	Description
R282 061 030	.085" microporous	1.78	1 R282 056 085 Replacement stripping blade
			2 R282 344 127 1.3 mm across flats male hex key
R282 067 030	.141" microporous	2.17	1 R282 056 118 Replacement stripping blade
			2 R282 344 127 1.3 mm across flats male hex key

DRILLING TOOL



Part number
R282 080 000

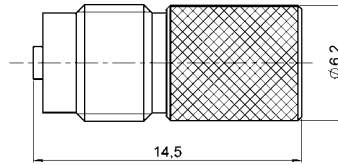
SCREW TAP



Part number
R282 082 000

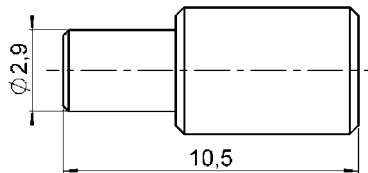


GLASS BEAD POSITIONER



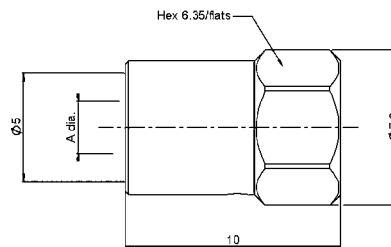
Part number
R282 745 000

POSITIONER GAUGE



Part number
R282 860 000

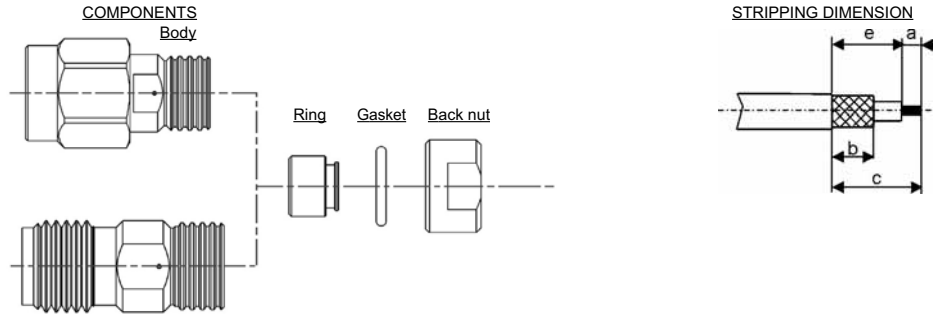
SOLDERING POSITIONER FOR MICROPOROUS SEMI-RIGID CABLE



Part number	Cable	A dia.
R282 744 190	.085" microporous	2.4
R282 744 192	.141" microporous	3.8

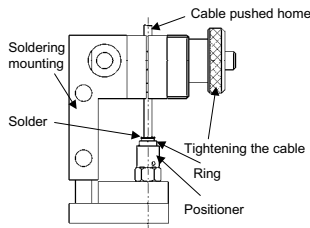


M 01



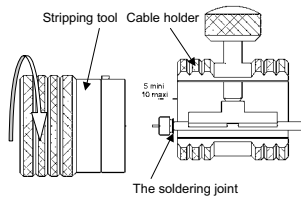
Part numbers	Cable	a (mm)	Tool box	Soldering mounting	Soldering positioner	Cable holder	Stripping tool	Pointer gauge	Torque wrench
R127 800 001 R127 820 001	.085" microporous	1.78	R282 120 220	R282 740 000	R282 744 190	R282 059 010	R282 051 030	R282 061 030	R282 323 000
R127 800 101 R127 820 101	.141" microporous	2.17			R282 744 192		R282 053 030	R282 067 030	

1



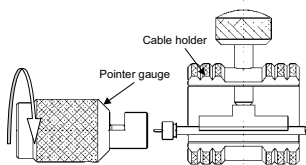
- 1-1 Cut the cable to the desired length.
- 1-2 Put the gasket until it bottoms against the nut (see figure paragraph 4 for the position).
- 1-3 Slide the back nut onto the cable before soldering operation.
- 1-4 Place the cable in the soldering mounting.
- 1-5 Fit the ring and positioner on the cable, and tighten.
- 1-6 Solder the ring on the cable.
- 1-7 Clean the soldering.

2



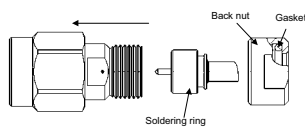
- 2-1 Immobilize the cable using the thumb screw on the cable holder. Do not tighten the soldered joint.
- 2-2 Check the position of cable in the v form of cable holder.
- 2-3 Position the stripping tool opposite the cable holder.
- 2-4 Turn and push both elements with respect to each other. Once they are bearing against each other, pull without turning.
- 2-5 Remove the residue of dielectric around the inner cable with a scalpel.

3



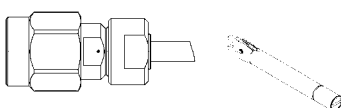
- 3-1 Position the pointer gauge opposite the cable holder.
- 3-2 Turn and push both elements with respect to each other until fully home.
- 3-3 Remove the cable from the cable holder.
- 3-4 Check the trimming.

4



- 4-1 Fit the soldered ring in the body housing.

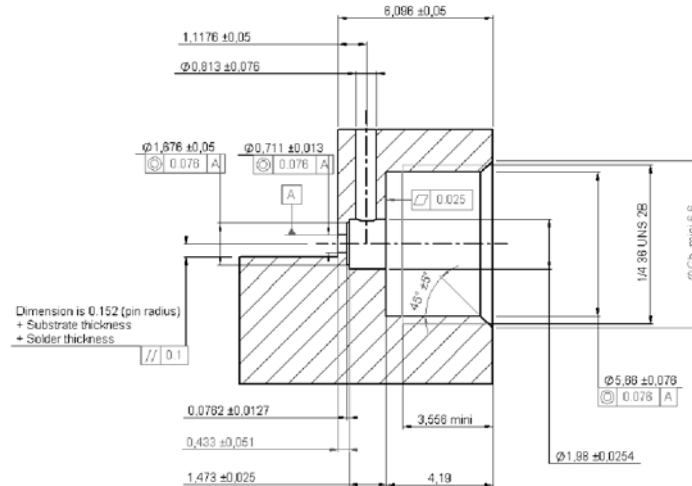
5



- 5-1 Tighten the nut using the torque wrench (8.67 Inchs/Lbs).



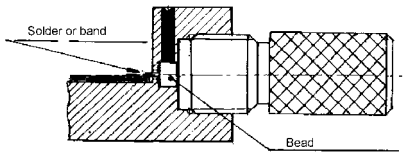
M 02



Part numbers	Positioner	Positioner gauge	Dynamometer screw driver	Drilling tool	Screw tap
R127 841 001	R282 745 000	R282 860 000	R282 341 010	R282 080 000	R282 082 000
R127 844 001			R282 342 000		

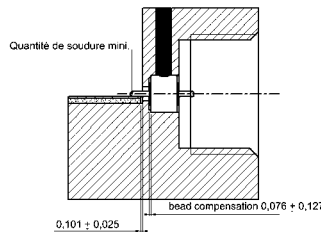
To obtain correct concentricity and dimensions on the panel drilling, we recommend to use RADIALL special tools: drilling tool and screw tap

1



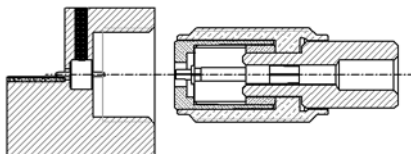
1-1 SOLDERING of the glass bead
Set up of the R280 760 040 glass bead in the housing. Keep the glass Bead into position thanks to R282 745 000 Positionner

2



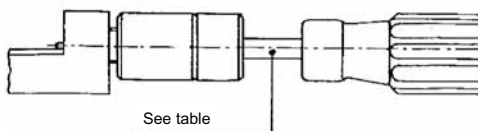
2-1 POSITION of the glass bead after soldering
Check the soldering quality as well as the position of the glass bead in the housing.

3



3-1 MOUNTING of the flange on the box
Set up the R282 860 000 position gauge on the flange to ensure a good concentricity. Screw the assembly on the housing.

4



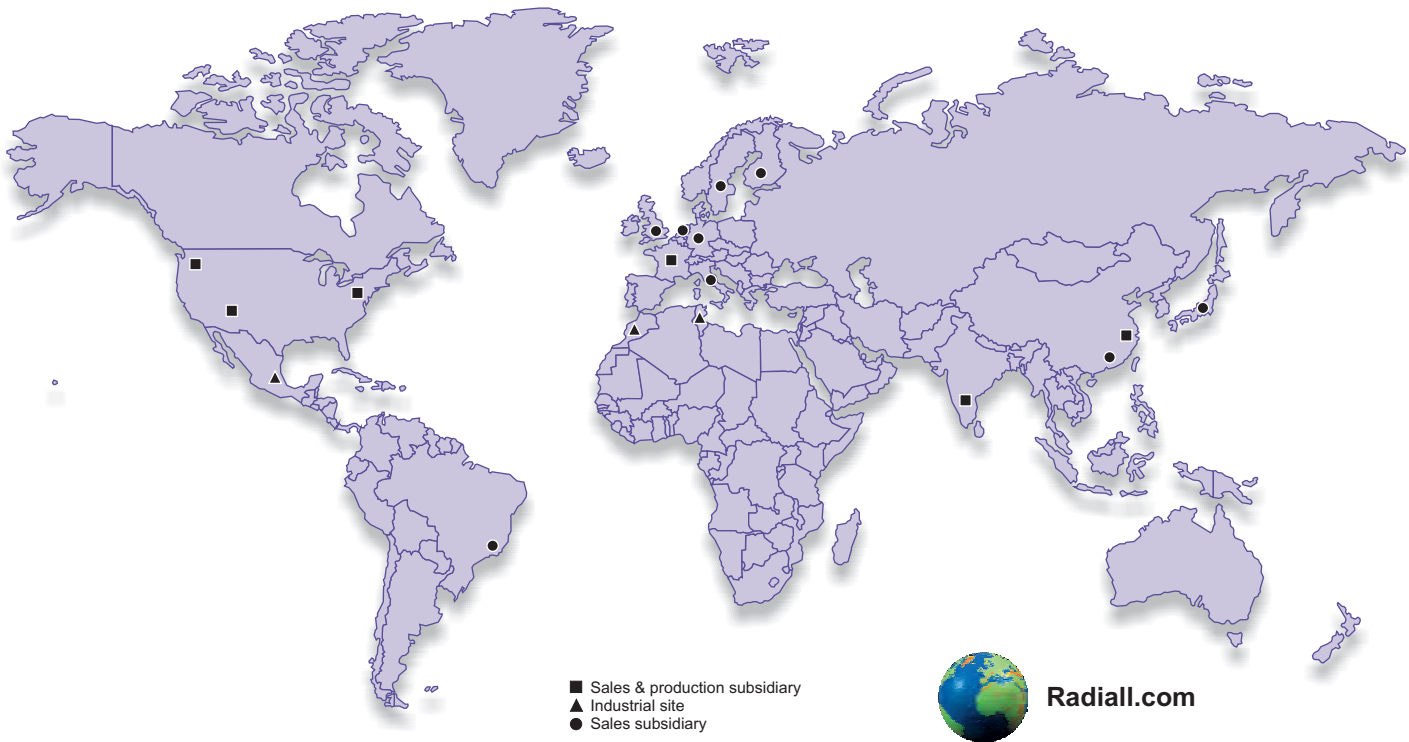
4-1 Locking of the flange on the box
Lock the flange on the housing thanks to dynamometer screw-driver.



Part numbers	Description	Page
R127 052 001	Straight plug, solder type for microporous .085" SR cable	14
R127 055 001	Straight plug, solder type for microporous .116" SR cable	14
R127 222 001	Straight jack, solder type for microporous .085" SR cable	14
R127 225 001	Straight jack, solder type for microporous .116" SR cable	14
R127 601 001	Screw-on, female receptacle (without glass bead)	14
R127 631 001	Square flange, female receptacle (without glass bead)	14
R127 632 001	2 holes flange female receptacle (without glass bead)	14
R127 638 001	Screw-on, male receptacle (without glass bead)	14
R127 646 001	Square flange, male receptacle (without glass bead)	14
R127 647 001	2 holes flange male receptacle (without glass bead)	14
R127 703 001	Straight male - male in-series adapter	14
R127 704 001	Straight male - female in-series adapter	14
R127 705 001	Straight female - female in-series adapter	14
R127 800 001	Straight plug, solder type for .085" microporous semi-rigid cables	7, 14
R127 800 101	Straight plug, solder type for .141" microporous semi-rigid cables	7
R127 820 001	Straight jack, solder type for .085" microporous semi-rigid cables	7, 14
R127 820 101	Straight jack, solder type for .141" microporous semi-rigid cables	7
R127 840 021	Square flange female receptacle with cylindrical center contact	8
R127 841 001	Universal screw-on female receptacle	7, 14
R127 842 001	Square flange female receptacle	8, 14
R127 844 001	Screw-on male receptacle	8, 14
R127 845 001	Square flange male receptacle	8, 14
R127 870 001	Female female in series adapters	9, 14
R127 871 001	Male male in series adapters	9, 14
R127 872 001	Female male in series adapters	9, 14
R137 800 001	Straight Plug, solder type, for .085" microporous semi-rigid cables	13
R137 800 101	Straight Plug, solder type, for .141" microporous semi-rigid cables	13
R137 820 001	Straight Jack, solder type, for .085" microporous semi-rigid cables	13
R137 820 101	Straight Jack, solder type, for .141" microporous semi-rigid cables	13
R137 840 021	Adjustable square flange jack receptacle with cylindrical contact	13
R137 841 001	Screw Jack receptacle for 0.3mm DIA pin	13
R137 842 001	Square flange jack receptacle for 0.3mm DIA pin	13
R137 844 001	Screw Plug receptacle for 0.3mm DIA pin	13
R137 845 001	Square flange Plug receptacle for 0.3mm DIA pin	13
R137 870 001	Straight female - female adapter	9, 13
R137 871 001	Straight male - male adapter	9, 13
R137 872 001	Straight female - male adapter	9, 13
R191 970 061	SMA 2.9 male - SMA 2.4 male between-series adapter	10, 14
R191 970 071	SMA 2.9 male - SMA 2.4 female between-series adapter	10, 14
R191 970 081	SMA 2.9 female - SMA 2.4 male between-series adapter	10, 14
R191 970 091	SMA 2.9 female - SMA 2.4 female between-series adapter	10, 14
R280 760 040	Glass bead 100 pcs	9
R280 760 040 W	Glass bead 1 pcs	9
R282 051 030	Stripping tool for .085" microporous semi-rigid cable	15, 17
R282 053 030	Stripping tool for .141" microporous semi-rigid cable	15, 17
R282 059 010	Cable holder	15, 17



Part numbers	Description	Page
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R282 067 030	Pointer gauge for .141" microporous semi-rigid cable	15, 18
R282 080 000	Drilling tool	18
R282 082 000	Screw tap	18
R282 120 220	Tool Box	15
R282 323 000	Torque wrench	15, 16
R282 341 010	Dynamometer screw driver	16
R282 342 000	Dynamometer screw driver	16
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R282 744 190	Soldering positioner for .085" semi-rigid cable	15, 19
R282 744 192	Soldering positioner for .141" semi-rigid cable	15, 19
R282 745 000	Glass bead positioner	19
R282 860 000	Positioner gauge	19
R404 280 000	Male coaxial fixed termination	11
R404 285 000	Female coaxial fixed termination	11
R413 300 000	0 dB Coaxial fixed attenuators	11
R413 301 000	1 dB Coaxial fixed attenuators	11
R413 302 000	2 dB Coaxial fixed attenuators	11
R413 303 000	3 dB Coaxial fixed attenuators	11
R413 304 000	4 dB Coaxial fixed attenuators	11
R413 305 000	5 dB Coaxial fixed attenuators	11
R413 306 000	6 dB Coaxial fixed attenuators	11
R413 307 000	7 dB Coaxial fixed attenuators	11
R413 308 000	8 dB Coaxial fixed attenuators	11
R413 309 000	9 dB Coaxial fixed attenuators	11
R413 310 000	10 dB Coaxial fixed attenuators	11
R413 320 000	20 dB Coaxial fixed attenuators	11
R570 813 000	SPDT switches no option	12
R570 813 100	SPDT switches with TTL driver	12
R570 823 000	SPDT switches with indicators	12
R570 833 000	SPDT switches no option	12
R570 843 000	SPDT switches with indicators	12
R570 843 100	SPDT switches with TTL driver	12
R573 813 000	SP3T to 6T switches no option	12
R573 813 100	SP3T to 6T switches with TTL driver	12
R573 823 000	SP3T to 6T switches with indicators	12
R573 833 000	SP3T to 6T switches no option	12
R573 843 000	SP3T to 6T switches with indicators	12
R573 843 100	SP3T to 6T switches with TTL driver	12
R577 813 000	DPDT switches no option	12
R577 813 100	DPDT switches with TTL driver	12
R577 823 000	DPDT switches with indicators	12
R577 833 000	DPDT switches no option	12
R577 843 000	DPDT switches with indicators	12
R577 843 100	DPDT switches with TTL driver	12



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