Procedimiento de instalación de conectores 2.9mm en cable .141” de bajas pérdidas.

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Procedimiento realizado en el CAY para la conexión de conector 2.9mm en cable semirrígido 0.141” de bajas pérdidas. Se adjuntan hojas de características de los diversos materiales utilizados.

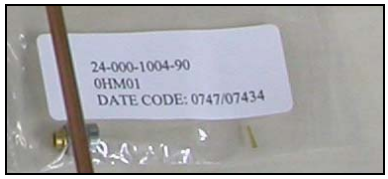
Fecha de creación viernes, 15 de febrero de 2008
Fecha de guardado viernes, 15 de febrero de 2008
Fecha de impresión jueves, 12 de junio de 2008

El objetivo de este trabajo es obtener cables cuyo coeficiente de reflexión en tensión, VSWR, sea mejor de 1.22:1 (lo que equivale a un S_{11} < -20dB) hasta 26GHz. Para ello en el presente informe se detallan los pasos a seguir para conectar al cable semirrígido de 0.141" y bajas pérdidas (Low Loss), en concreto el UT-141C-LL de Microcoax, el conector 2.9mm del fabricante SRI 24-000-1004-90. Pasos:

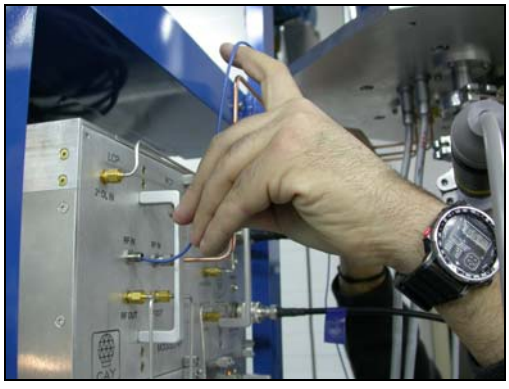
1. El material empleado en la fabricación de estos cables se detalla en las siguientes figuras. Las hojas de características se incluyen en el anexo, así como el procedimiento establecido por el fabricante SRI para la colocación del conector.

Flux del fabricante LakeShore: 40z

Conector de fabricante SRI (24-000-1004-90)

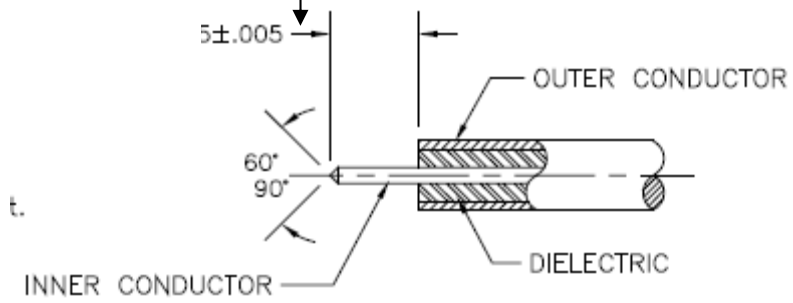


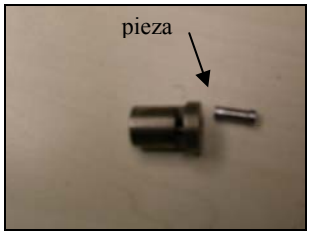
2. Medir, con ayuda de un cable flexible, cuerda o similar, la longitud aproximada que tendrá el cable semirrígido. Cortar, un poco más largo, el cable necesario con ayuda de la segueta.



3. Cortar el conductor exterior y el teflón, ayudándose de la sierra y de la herramienta del kit (herramienta número 55 del kit radiall R282 120, cuya foto se adjunta en el anexo) en la que se introduce una pieza (*ver foto) distinta según el teflón del cable sea PTFE (más fina) o LDPTFE gracias a la cual la longitud del conductor central será de:

Cable low-loss: 1.65mm
Cable PTFE: 2.79mm

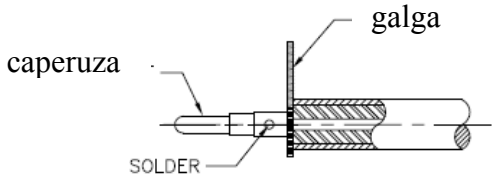




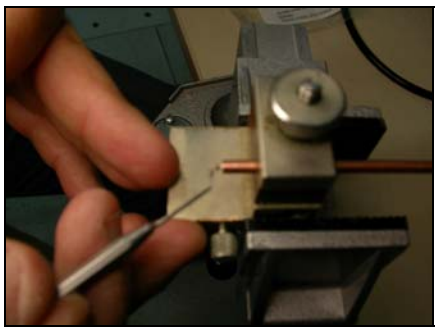
4. Limar la punta del conductor central y del exterior, para quitarle las rebabas.

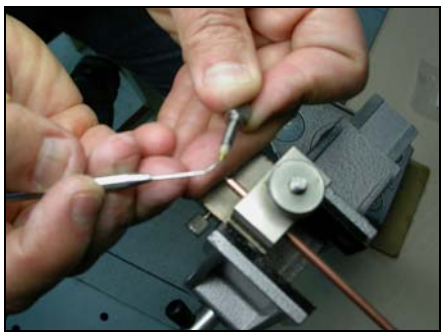
5. Con ayuda del microscopio, eliminar con el bisturí el teflón (sobre todo el que queda junto al conductor interior) para que la superficie que forma teflón-conductor exterior sea plana (y perpendicular al conductor interior). Ninguna rebaba de teflón debe impedir que la galga del paso siguiente apoye completamente sobre el conductor exterior.

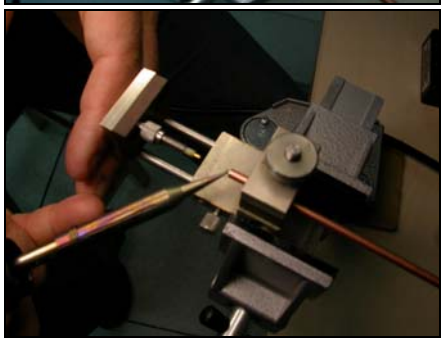
6. Soldar la caperuza al conductor interior:



1. Colocar una galga de 0.2 mm de espesor. Comprobar que no queda ninguna rebaba de teflón que impida a la galga apoyar completamente.
2. Ajustar la caperuza y comprobar que el final del conductor central llega hasta la mitad del agujero circular de la caperuza. En caso contrario, limar un poco el conductor central. Sacar la caperuza.
3. Introducir, con ayuda de un gancho fino, un poco de pasta de soldar (solder cream) tipo SN62 (RA10) (preferiblemente de tipo CLEAN) dentro de la caperuza del conductor interior, y en el conductor interior.

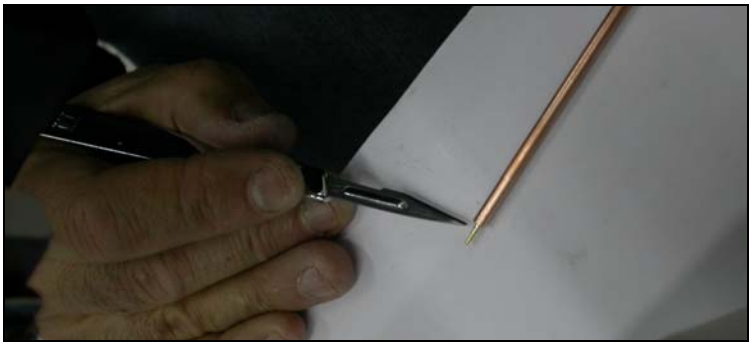






4. Colocar la caperuza de nuevo, apretándola firmemente contra la galga. La distancia a la que queda la caperuza del teflón/conductor exterior es crítica.

5. Con el soldador aplicar calor en la caperuza. El estaño debería fundir soldando la caperuza al conductor interior. No debe quedar nada de estaño pegado a la caperuza ni una bola de estaño en el agujero de la caperuza. Eliminar cualquier resto de estaño en la caperuza raspándolo con suavidad con ayuda de bisturí y microscopio (sin dañar la caperuza).



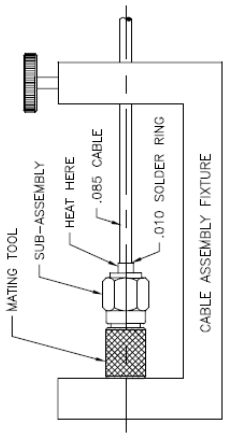
6. Eliminar, en caso necesario, el teflón que por calor se haya salido del conductor exterior, con ayuda del microscopio y del bisturí.
7. Limpiar con alcohol isopropílico.

7. Soldar el cuerpo del conector al conductor exterior.

1. Introducir a presión el cuerpo del conector en el cable.

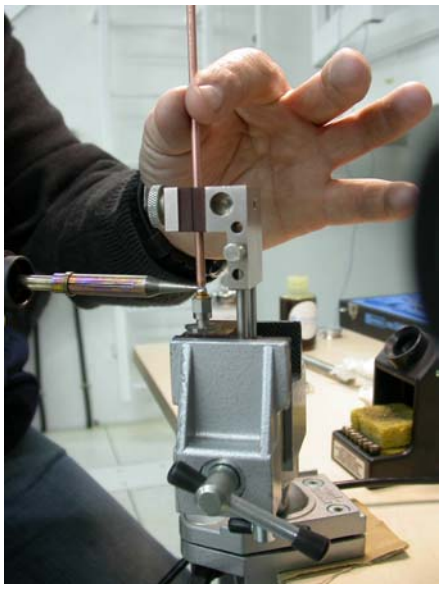
2. Roscar la pieza (hecha en el taller del CAY), denominada "mating tool", que evita que el pin quede más fuera de lo debido. Obliga al pin a quedarse a 0.003 milipulgadas más dentro de su posición.

3. Colocar como en la figura, boca abajo para que al calentar el estaño fluya hacia abajo por gravedad y capilaridad.



4. Aplicar flux en la zona del conductor exterior a soldar (1cm), junto al cuerpo del conector.

5. Girar lentamente el cable, aplicar el soldador en el extremo final del cuerpo del conector (donde dice "heat here") junto con el estaño hasta que tome una temperatura suficiente para que el hilo de estaño funda. El flux ayudará al estaño a introducirse entre el conector y el cable para reducir el tiempo de soldadura. Este paso no debe exceder los 20 segundos, sino el teflón se expande reduciendo el S11 del cable por encima de los -20dB. Requiere la presencia de dos personas, una para girar el cable y la otra para aplicar el soldador y el estaño.

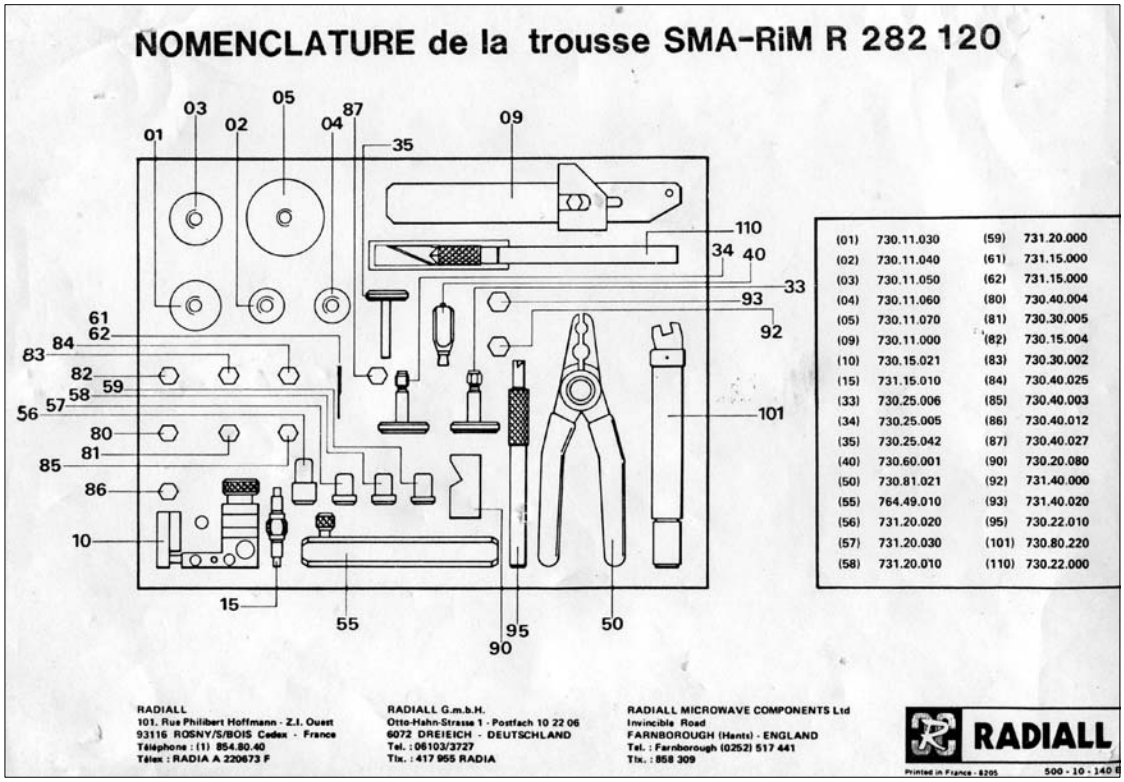


6. Limpiar con alcohol isopropílico para eliminar los restos de fundente.

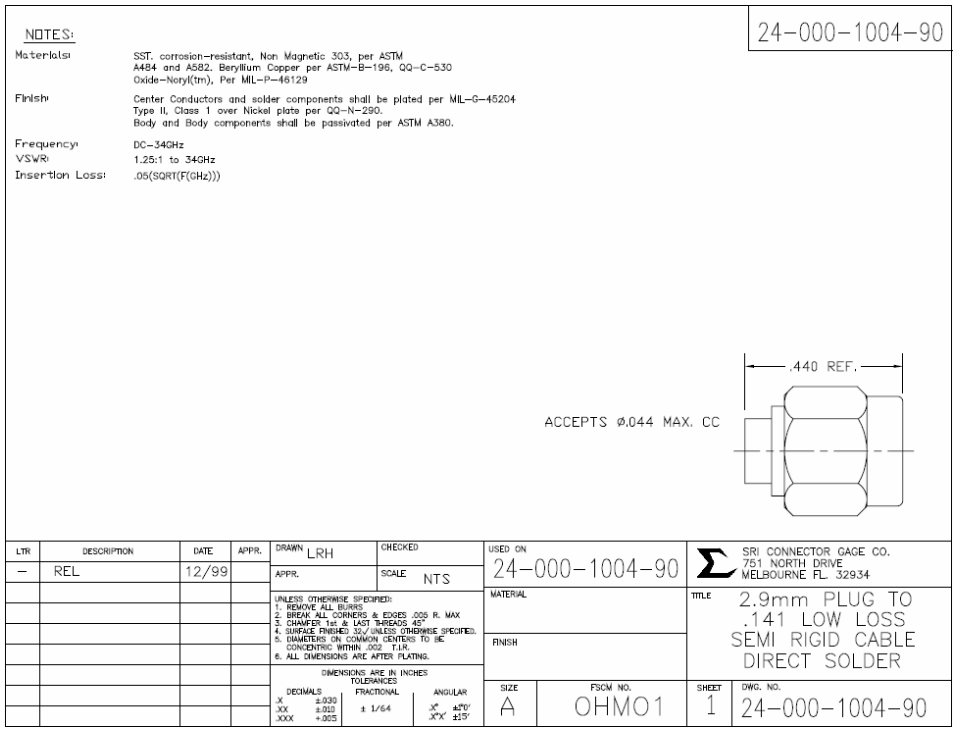
8. Comprobar que la distancia del pin central al plano de referencia del conector está en el rango: 1,32-1,47mm. Utilizar los gauges de Maury.

Anexo:

A. Kit de Radiall utilizado (actualmente descatalogado).



B. Conector 24-000-1004-90 de SRI.



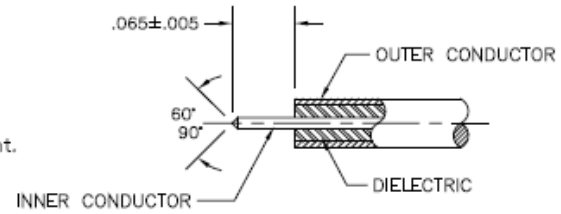
C. Procedimiento de SRI para la colocación del conector:

24-000-1004-90

1.

1.0 PREPARATION OF CABLE:

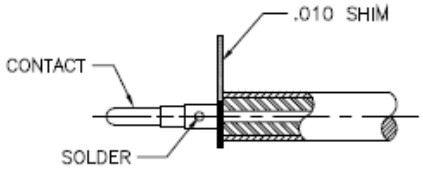
1.1 Trim cable to dimensions shown.
1.2 File blunt end of cable inner conductor to a 60°/90° Cone.
1.3 Remove burrs and sharp edges from outer conductor with scotch brite.
1.4. Dip prepared end of cable into flux, then into solder pot approx. 1/2 inch. Forming a thin coat of tin on the outer and inner conductor.
(Remove Excess solder if needed)clean with solvent.



2.

2.0 SOLDERING OF CENTER CONTACT TO INNER CABLE CONDUCTOR.

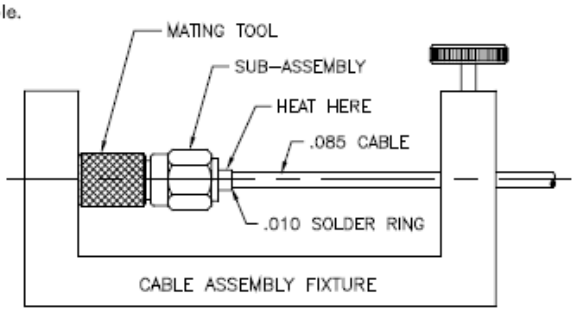
2.1 Place shim on center conductor resting firmly against Cable Dielectric.
2.2 Heat center contact and slide it over inner conductor to rest Firmly against shim.
2.3 Solder contact as shown using 60/40.
2.4 Remove excess solder and clean with solvent.



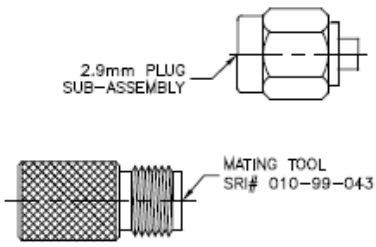
3.

3.0 SOLDERING OF CABLE SUB-ASSEMBLY TO BODY.

3.1 Form a ring (360°) with .010 solder around cable.
3.2 Thread mating tool into connector.
3.3 Insert cable Sub-Assembly into back of connector Housing until it bottoms. Place into Fixture and clamp cable to prevent movement while soldering.
3.4 Using resistive soldering iron, heat housing (Holding Downwards) Until solder flows evenly around cable and housing.
3.5 Remove Mating tool and clean solder joint with solvent (alcohol). Verify that solder is FREE of voids.
3.6 Inspect center contact length from Reference Plane (.052/.058)



•CAUTION: Avoid using cleaning fluids containing halogenated and aromatic hydrocarbons, these chemicals can cause damage to the center conductor support bead. (Use Isopropyl Alcohol for Cleaning Procedures.)



USED ON 24-000-1004-90

SRI CONNECTOR GAGE CO.
751 NORTH DRIVE
MELBOURNE FL. 32934

DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMALS: .X ±.030, .XX ±.015, .XXX ±.005
FRACTIONAL: ± 1/64
ANGULAR: .X° ±1°0', .X°X' ±15'

TITLE: ASSEMBLY INSTRUCTIONS 2.9mm PLUG TO .141 LOW LOSS SEMI-RIGID CABLE

DRAWN: LRH
DATE: 08/00

SIZE: A
FSCM NO.: 0HM01
SHEET: 1
USED ON: 24-000-1004-90

D. Hoja de características del cable: Microcoax UT-141C-LL

LOW LOSS PHASE STABLE SEMI-RIGID COAXIAL CABLE*

MICRO-COAX Part Number	UT 31-LL	UT 47C-LL	UT 70-LL	UT 85C-LL	UT 120C-LL	UT 141C-LL
DIMENSIONS						
Outer Conductor Diameter (in)	0.031 ± 0.001	0.047 ± 0.001	0.070 ± 0.001	0.0865 ± 0.001	0.120 ± 0.001	0.141 ± 0.002
(mm)	0.787 ± 0.025	1.194 ± 0.025	1.778 ± 0.025	2.197 ± 0.025	3.048 ± 0.025	3.581 ± 0.051
Dielectric Diameter (in)	0.024 ± 0.001	0.037 ± 0.001	0.059 ± 0.001	0.066 ± 0.001	0.106 ± 0.001	0.1175 ± 0.002
(mm)	0.610 ± 0.025	0.940 ± 0.025	1.499 ± 0.025	1.676 ± 0.025	2.692 ± 0.025	2.984 ± 0.051
Center Conductor Diameter (in)	0.0080 ± 0.0005	0.0126 ± 0.0005	0.0201 ± 0.0005	0.0226 ± 0.0005	0.036 ± 0.001	0.0403 ± 0.001
(mm)	0.203 ± 0.013	0.320 ± 0.013	0.511 ± 0.013	0.574 ± 0.013	0.914 ± 0.025	1.024 ± 0.025
Length Range (ft)	1-20	1-20	1-20	1-20	1-20	1-20
(m)	0.31-6.10	0.31-6.10	0.31-6.10	0.31-6.10	0.31-6.10	0.31-6.10
MATERIALS						
Outer Conductor	COPPER	COPPER	COPPER	COPPER	COPPER	COPPER
Dielectric	LD PTFE	LD PTFE	LD PTFE	LD PTFE	LD PTFE	LD PTFE
Center Conductor	SPCW	SPC	SPCW	SPC	SPC	SPC
ELECTRICAL PROPERTIES						
Characteristic Impedance	50 ± 2	50 ± 2	50 ± 1.5	50 ± 1.5	50 ± 1	50 ± 1.5
Capacitance (Nominal) (pF/ft)	26.6	26.6	26.6	26.6	26.6	26.6
(pF/M)	87.3	87.3	87.3	87.3	87.3	87.3
Corona Extinction Voltage (VRMS @ 60 Hz)	500	1000	1200	1500	1800	1900
Voltage Withstanding (VRMS @ 60 Hz)	1000	2000	2300	2500	4000	5000
Higher Order Mode (GHz)	175	115	72	64	40	36
Typical Attenuation (dB/100 ft)/Average Power (Watts CW) @ 20°C and Sea Level	Atten / Power	Atten / Power	Atten / Power	Atten / Power	Atten / Power	Atten / Power
0.5 GHz	33.8 / 60	22.0 / 124	13.9 / 263	12.4 / 340	7.8 / 676	7.0 / 821
1.0 GHz	47.8 / 42	31.2 / 88	19.7 / 185	17.6 / 239	11.0 / 475	10.0 / 576
5.0 Ghz	107.6 / 19	70.5 / 39	44.6 / 81	40.1 / 105	25.4 / 206	23.0 / 249
10.0 GHz	152.8 / 13	100.4 / 27	63.8 / 56	57.4 / 73	36.6 / 142	33.3 / 172
18.0 GHz	206.2 / 10	135.8 / 20	86.8 / 41	78.1 / 53	50.2 / 103	45.8 / 124
20.0 GHz	217.6 / 9	143.3 / 19	91.7 / 39	82.6 / 50	53.2 / 98	48.5 / 117
26.5 GHz	251.3 / 8	165.8 / 16	106.4 / 34	95.9 / 43	62.1 / 84	56.7 / 100
40.0 GHz	310.5 / 6	205.6 / 13	132.6 / 27	119.6 / 35	78.1 / 66	– / –
60.0 GHz	383.0 / 5	254.5 / 10	165.0 / 21	149.2 / 28	– / –	– / –
MECHANICAL PROPERTIES						
Max. Operating Temp. (°C)	250	250	250	250	250	250
Min. Inside Bend Radius (in)	.125	.125	.250	.250	.375	500
(mm)	3.175	3.175	6.35	6.35	9.525	12.7
Weight (lbs/100 ft)	.16	0.39	0.77	1.39	2.10	3.20
(kg/100 m)	.24	0.59	1.15	2.07	3.13	4.76

*Standard inventory item.

NOTE: For tin-plated outer conductor add "-TP" to the part number. Tin plating will add 0.001 inch (.025 mm) to the outer conductor diameter and slightly reduce the average power. Tin plating will also reduce the maximum operating temperature to 225°C.

24 Micro-Coax®, 206 Jones Blvd., Pottstown, PA 19464-3465 USA □ 610/495-0110 □ FAX: 610/495-6656 □ E-mail: sales@micro-coax.com

E. Pasta SN62 para soldar: Multicore SN62.

MULTICORE SOLDERS

A DIVISION OF HENKEL LOCTITE ADHESIVES LIMITED

Kelsey House • Wood Lane End • Hemel Hempstead
Hertfordshire • HP2 4RQ • UK
Telephone: +44 (0) 1442 233233 • Fax: +44 (0) 1442 269554

Revision

Material Safety Data Sheet

Product Information

1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

Product Name Multicore Sn62 RA10 Solder Creams

High activity RA type solder creams for printing and reflow in air.

Multicore's product coding system precisely defines the features of a particular grade of cream.

Example: Sn62RA10BAS86

Sn62	Alloy present in the cream
RA10	The flux medium type
BAS	The solder powder size range
86	The nominal metal content (% w/w)

The solder powder size range and the metal content do not affect the health and safety properties of the creams.

Manufacturer Multicore Solders, Kelsey House, Wood Lane End,
Hemel Hempstead, Herts, HP2 4RQ, United Kingdom
Telephone +44 (0)1442 233233

2. COMPOSITION / INFORMATION ON INGREDIENTS

Alloy	*Nominal Concentration of Elements Present in the Alloy (% w/w)*		
	Tin	*Lead*	*Silver*
Sn62	62	36	2

The above figures are nominal concentrations. Reference should be made to the appropriate specification for the levels of permitted impurities.

Concentration of Hazardous Substances in the Medium (% w/w)		
Modified Rosin	*Rosin*	*Propan-1,2-diol*
2 - 5	40 - 45	5 - 10

Classification of hazardous ingredients in the solder creams

Ingredient	*CAS Number*	*EINECS Number*	*Classification Symbol*	*Risk Phrases*
Tin/Lead alloy powder	-	-	-	-
Rosin	8050-09-7	232-475-7	Xn	R 43
Propan-1,2-diol	57-55-6	200-338-0	-	-

Risk phrases

R38 Irritating to skin
R43 May cause sensitisation by skin contact

Issue No: 5	Number: HS RA10 Sn62	Page 1 of 6
Date: 22 October 2002	Prepared by: *Barry Chase*	
	Authorised by: *Barry Chase*	
This is an uncontrolled copy within Multicore Solders' ISO 9001 system. Recipients are advised to check that they have the current version after 12 months from the issue date.		

Product Data Sheet

LOCTITE®

Product RA10

June 2003

RA SOLDER CREAMS

Multicore RA10 has been formulated as an active product for printing and reflow in air. RA10 solder creams offer good open time, high soldering activity and good printing quality.

- **High activity to deal with poor component solderability**
- **Suitable for printing and dispensing applications.**
- **Good slump resistance**
- **Good tack performance and printer open time**

PRODUCT RANGE

Multicore RA10 solder creams may be supplied with powder made from most solder alloys in the Multicore Product Range. The most common alloys used are Sn60, Sn62 and Sn63 conforming to the purity requirements of JSTD-006 and EN 29453. Minimum order requirements may apply to certain alloys and powder particle sizes.

Multicore RA10 contains an RA type of activator and will be suitable to meet the demands of high volume production processes using components and boards, which have less than the desirable level of solderability.

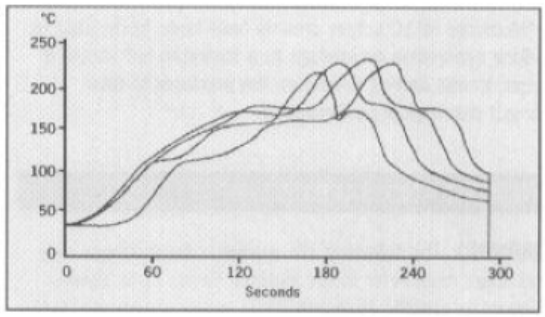
RA10 may be used as a No Clean Solder Cream for many consumer electronics assembly processes.

Metal Content, % in RA10 Solder Creams For Particular Applications

Application (Viscosity)	Solder Powder Particle Size			
	Size	53-38µm	45-20µm	38-25µm
	Multicore Code	AAS	AGS	DAS
Dispensing (500,000cP)		86 (500,000)	-	-
Screen Printing (650,000cP)		88 (650,000)	-	-
Stencil Printing (820,000 900,000cP)		90 (820,000)	90 (850,000)	90 (900,000)

RECOMMENDED OPERATING CONDITIONS

Reflow: It is not possible to specify ideal conditions for reflow since they depend more on the design of the boards and the capability of the reflow equipment. RA10 has been successfully reflowed with a wide range of temperature profiles. It may be reflowed in an air atmosphere. The following shows examples of profiles used successfully in practice.



Cleaning: The residues from Multicore RA10 solder creams may be left on the PCB in some applications where they do not pose a hazard to long-term reliability. They may be removed in conventional cleaning processes based on solvents such as Multicore Prozone. If enhanced residue reliability is required without cleaning with conformance to the IPC Type L specification, the user should evaluate Fastprint MP200 solder creams.

TECHNICAL SPECIFICATION

Solder Powder: The solder powder for Multicore RA10 solder creams is produced by atomising alloys conforming to the purity requirements of JSTD-006, EN 29453 or other national and international standards where relevant.

Careful control of production processes ensures that the solder powder is at least 97% spherical and contains less than the minimum level of contaminants that would adversely affect solder cream performance. A typical maximum oxide contamination level of 80ppm (expressed as oxygen in the solder) is regularly achieved or bettered.

Solder Cream Medium: Multicore RA10 contains a stable resin system and a blend of solvents.

The flux has been formulated to meet the requirements of IPC type MR3CN specification or the MIL-F 14256 RA classification.

Solder Cream: The properties of a solder cream depend in part on the metal content, the solder alloy and the solder powder particle size range. In general terms, increasing metal content reduced the tendency to slump and reduces the tackiness of the solder cream while the solder balling performance improves.

PACKAGING

Containers: Multicore RA10 solder creams are supplied in:

- 1 kg, 500g or 250g plastic jars with an insert to seal off the surface of the cream
- 1kg vacuum filled cartridges for direct application

Other forms of packaging may be available on request.

Shelf Life: Providing Multicore RA10 solder creams are stored at 5-10°C tightly sealed in the original container, a minimum shelf life of 6 months can be expected.

Multicore RA10 solder creams have been formulated to reduce separation on storage to a minimum but should it occur, gentle stirring will return the products to their correct rheological performance.

HEALTH AND SAFETY

WARNING: The following information is for guidance only and users must refer to the Material Safety Data Sheet relevant to Multicore RA10 solder paste product before use.

Fumes, Vapours and Precautions: The flux fumes given off at soldering temperatures are irritating to the nose, throat and respiratory organs. Prolonged or repeated exposure to the fumes may cause sensitisation.

These materials should always be used in a well ventilated area and suitable fume extraction should be used to extract flux fumes away from the operators.

Protection and Hygiene: Suitable protective clothing should be worn to prevent materials from coming into contact with the skin and eyes. If the materials come into contact with the skin, the affected area should be cleaned with a proprietary hand cleanser followed by washing with soap and water. If the materials come into contact with the eyes, they should be irrigated thoroughly with running water for at least 10 minutes and medical attention sought.

Eating, drinking or smoking should not be permitted in the working area and hands should be washed thoroughly with soap and warm water before eating.

Fire Hazards and Precautions: The flashpoint of the solvent used in these materials is high (118°C) but it is combustible. Carbon dioxide, foam or dry powder extinguishers are suitable. High temperatures may produce heavy metal dust, fumes and/or vapours. Do not use water where molten metal is present.

Spillage and Waste Disposal: Spills of the materials should be scraped up and the contaminated area washed with water. Waste materials should be stored in closed containers and disposed of in accordance with the relevant local and national regulations.

LOCTITE®

MSL705

Loctite Electronics

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F. Medidores gauge del fabricante Maury, A034B.

MAURY MICROWAVE CORPORATION

Models A034B and A034C

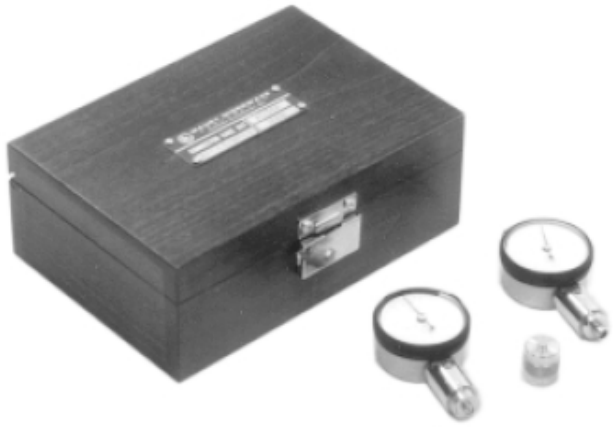
05 May 1997

PRECISION CONNECTOR GAGE KIT

APC3.5 and MPC3

Features

- Direct Reading
- Self Checking
- Accurate
- Easy To Use



Description

The Maury A034B and A034C are designed to provide a fast and accurate means of checking the critical center conductor contact pin locations of 3.5mm (APC3.5) and 2.92mm (K) connectors relative to the outer conductor mating plane. The critical interface dimensions are shown in Figure 1.

Both models consist of two gage assemblies, one each for the female and male connectors, and a master gage. All components are housed in a foam-lined, wooden instrument case. The gage assemblies are dial indicators which when zero-set by means of the master gage will indicate the actual deviation of the center contact from the outer conductor mating plane. The A034B has an accuracy of better than ±0.00025 inch and a dial resolution of the same amount. For the more critical applications, the A034C provides +0.0001 inch accuracy and resolution. All gaging parts and the master gage are fabricated from stainless steel for durability and excellent dimensional stability.

Model	Gage Assemblies	Dial Graduations	Description
A034B	2	0.00025	Measures contact pin location of 3.5mm and 2.92mm female and male precision connectors.
A034C	2	0.00010	Measures contact pin location of 3.5mm and 2.92mm female and male precision connectors for more precise measurement applications.

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Application

The critical contact pin locations of 3.5mm and 2.92mm female and male precision connectors are shown in Figure 1. These dimensions must be maintained in order to provide proper electrical performance and mechanical mating of the connectors. The connectors are designed to achieve a co-planar mating of the center conductors and outer conductors at the outer mating plane. Destructive interference will result if the contacts protrude beyond the outer conductor mating planes. This interference may cause buckling of the female contact fingers or damage to associated equipment during mating. Alternately, an excessive gap of the mated center contacts produces high reflections and reduces peak power handling capability. These precision connectors should be gaged routinely to ensure compliance to applicable specifications, to prevent destructive mating, and to ensure proper electrical performance. Additionally, connectors on all equipment should be gaged periodically to detect out of tolerance conditions which may impair electrical performance or cause damage to mating connectors. The A034B and C are very useful in a variety of applications such as: production checkout, incoming inspection, quality control and laboratory measurements.

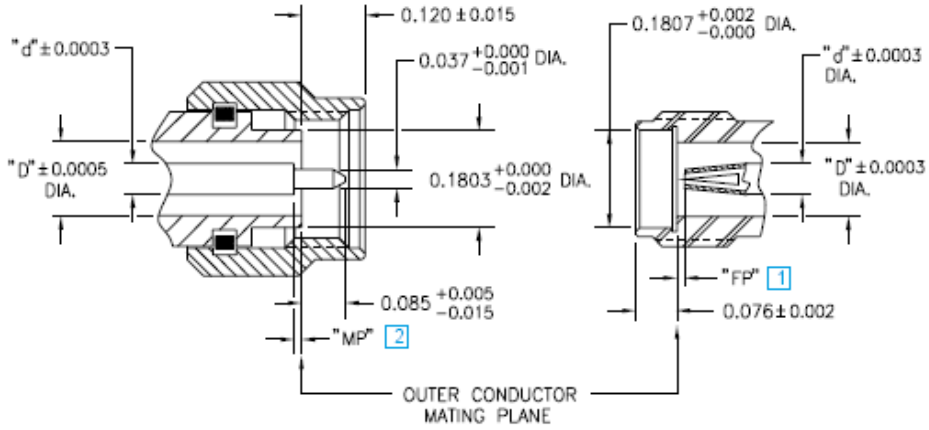

Figure 1 — Critical contact pin location dimensions of APC3.5 and MPC3 type precision connectors

Connector Type	d	D	"FP" 3	"MP" 3	Comment
APC3.5	0.0598	0.1378	0.000 +0.003 -0.000	0.000 +0.003 -0.000	Rated to 34 GHz
MPC3	0.0500	0.1150	0.000 +0.003 -0.000	0.000 +0.003 -0.000	Rated to 40 GHz

1 Female contact pin location -- use gage assembly marked "F".

2 Male contact pin location -- use gage assembly marked "M".

3 Tighter tolerances can be used at user's discretion.

NOTE: Minus (-) tolerances indicate a recessed condition from the outer conductor mating plane. Plus (+) tolerances indicate a protruding condition above the outer conductor mating plane. Other dimensions shown in these figures are shown since they affect the mating of the gage assembly's gaging mechanisms (bushing and pin). Deviation from these dimensions may cause measurement errors or improper fit between the gaging mechanisms and the connectors being measured. Consult our Customer Service department on measuring connectors with interface dimensions other than specified above.

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