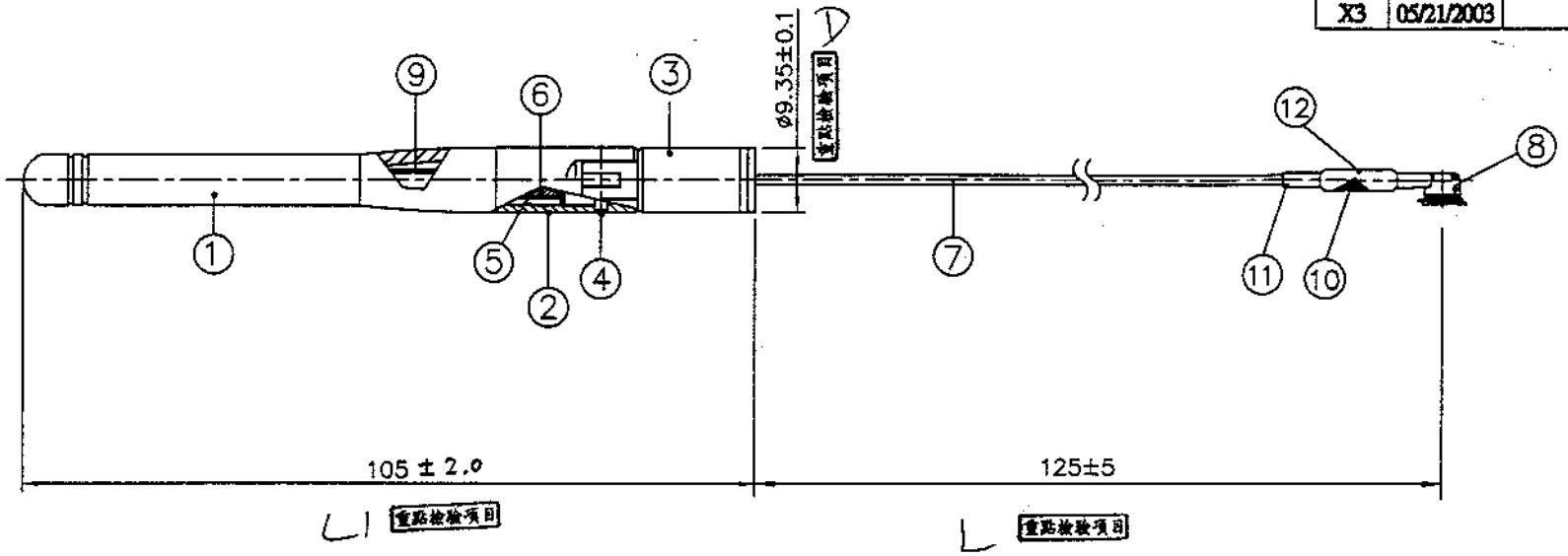
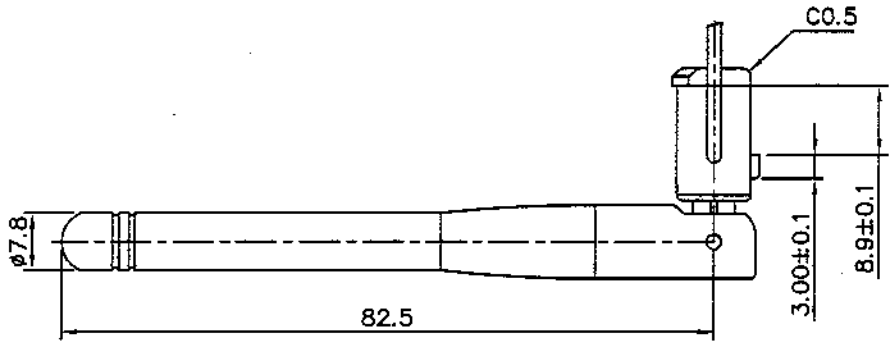
CG-XX

REV	DATE	DESCRIPTION
X1	03/26/2003	New Issue
X2	04/07/2003	Changed Antenna Color
X3	05/21/2003	Added Tube





NO	DESCRIPTION		QTY	REMARK
12	Tube	Heat Shrink Tube	1	
11	Tube	Heat Shrink Tube	2	
10	Core	RH 4*10*2	1	
9	Tube	Brass	1	
8	Connector	I-PEX Connector	1	
7	Cable	ø1.13 Coaxial Cable	1	
6	Insulator	ABS Compound , White	1	
5	Ground Tube	Brass ; Ni Plated	1	
4	Rivet	Brass ; Cr Plated (Black)	2	
3	Antenna Base	PC Color : Sapphire Blue	1	
2	Antenna Base	PC Color : Sapphire Blue	1	
1	Antenna Body	TPE Color : Sapphire Blue	1	

CUSTOMER'S SINGATURE

XX.	±3.0
X.	±2.0
X	±1.0
.XX	±0.5
.XXX	±0.1

APPROVED

CHECKED

DRAWING

CUSTOMER: 亞旭科技股份有限公司

PART NO :

PARTNAME: Antenna Cable Assembly for 3dbi

W.Y P/NO : C407-510135-A

REV	UNIT	FILE :
X3	m/m	SHEET : 1/1

Wha Yu
INDUSTRIAL CO.,LTD.
講裕實業股份有限公司

WHA YU INDUSTRIAL CO., LTD. (HEAD OFFICE)

TAI HWA ELECTRONIC CO., LTD.(CHINA)
SHANGHAI HUA YU ELECTRONIC CO., LTD.(CHINA)

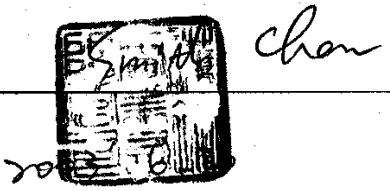
SPECIFICATION FOR APPROVAL

CUSTOMER: 亞旭科技股份有限公司

PART NAME: RF Antenna Assembly

PART NO: 3907-00067A *REVISION:*

W. Y. P/NO.: C407-510135-A *REV.:* X4

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :		

WHA YU GROUP

WHA YU INDUSTRIAL CO., LTD. (HEAD OFFICE)
譁裕實業股份有限公司
Address: #70 Shui Li Road, Hsin Chu City, Taiwan, R.O.C.
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TAI HWA ELECTRONIC CO., LTD. (CHINA)
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SHANGHAI HUA YU ELECTRONIC CO., LTD. (CHINA)
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Pu Country Shanghai, China
Tel: + 86-21-59741348 • + 86-21-59743624
Fax: + 86-21-59741347

RF Antenna Cable Assembly

Specification

1. Electrical Properties :

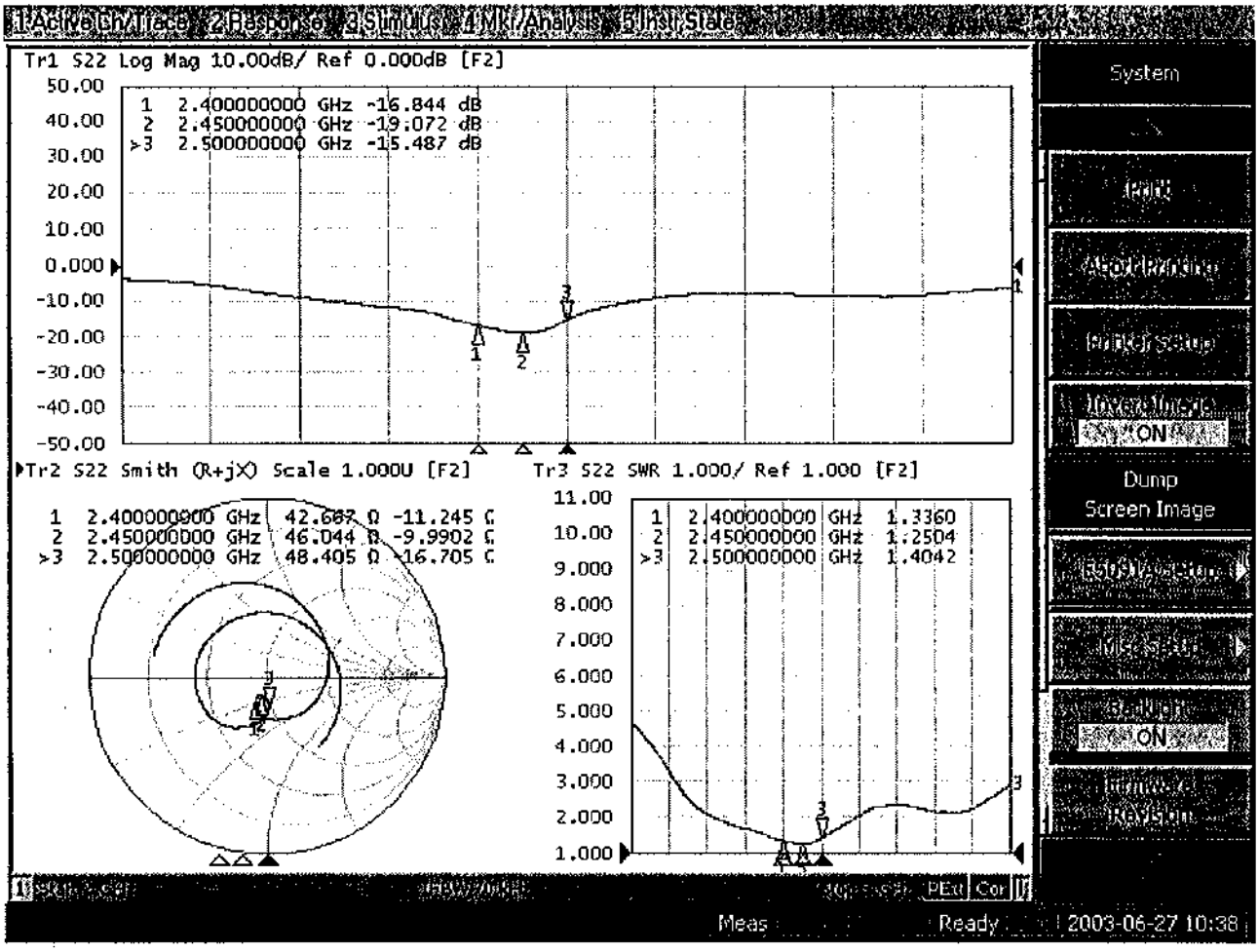
1.1 Frequency Rang..... 2.4GHz ~ 2.5GHz
1.2 Impedance ..... 50Ω Nominal
1.3 VSWR .....2.0 Max.
1.4 Return Loss..... -9.5 dB Maximum
1.5 Electrical Wave.....1/2 λ Helix
1.6 Gain..... 3 dbi
1.7 Admitted Power..... 1W

2. Physical Properties :

2.1 Cable..... Φ1.13 Cable
2.2 Antenna Cover.....TPE
2.3 Antenna Base..... PC
2.4 Operating Temp. .....-20℃ ~ +65℃
2.5 Storage Temp. .....-30℃ ~ +75℃
2.6 Color .....Shapphire Blue
2.7 Connector..... I-PEX
2.8 Core..... RH 4*10*2

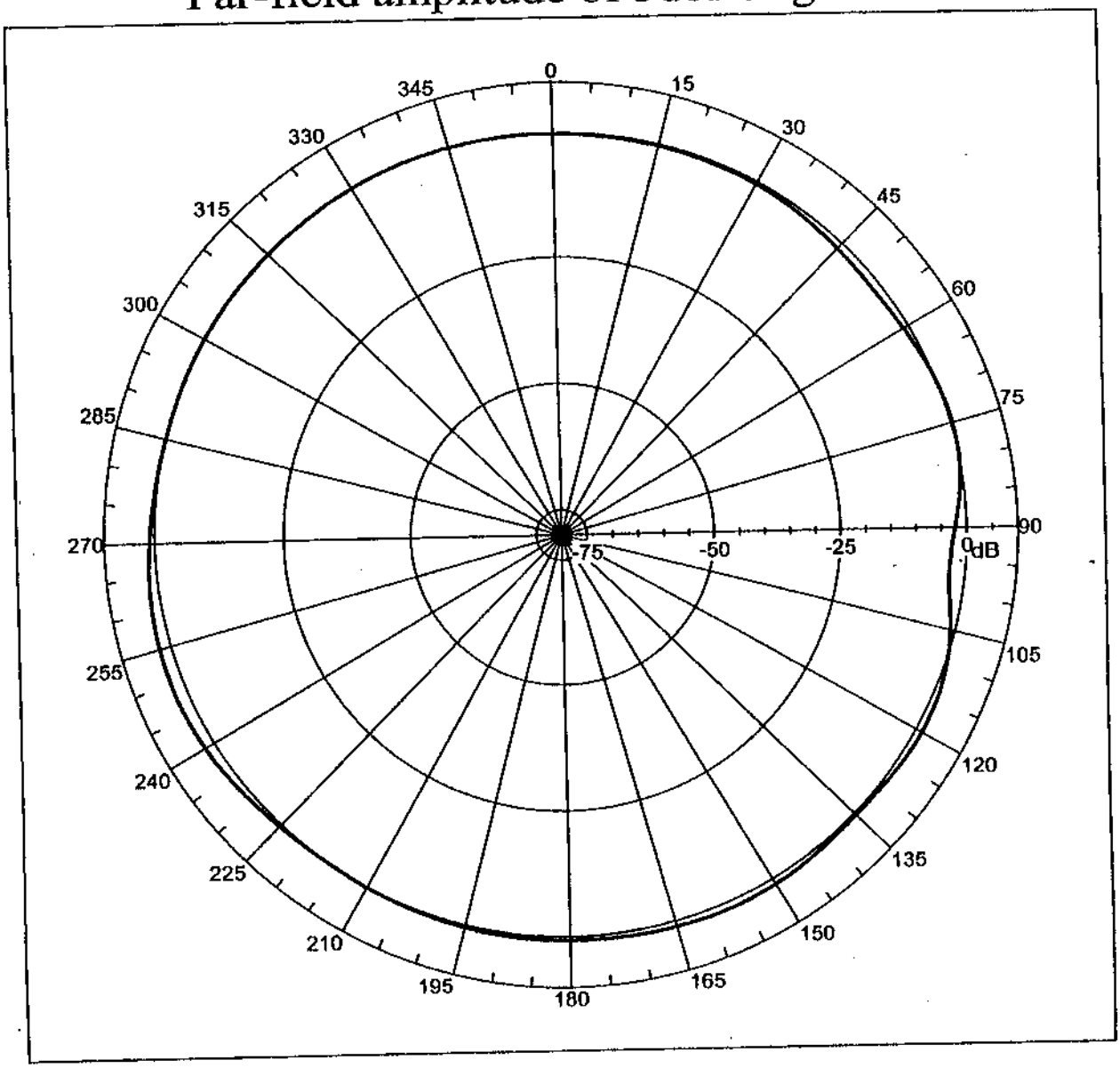
譁裕實業股份有限公司

WHA YU INDUSTRIAL CO., LTD



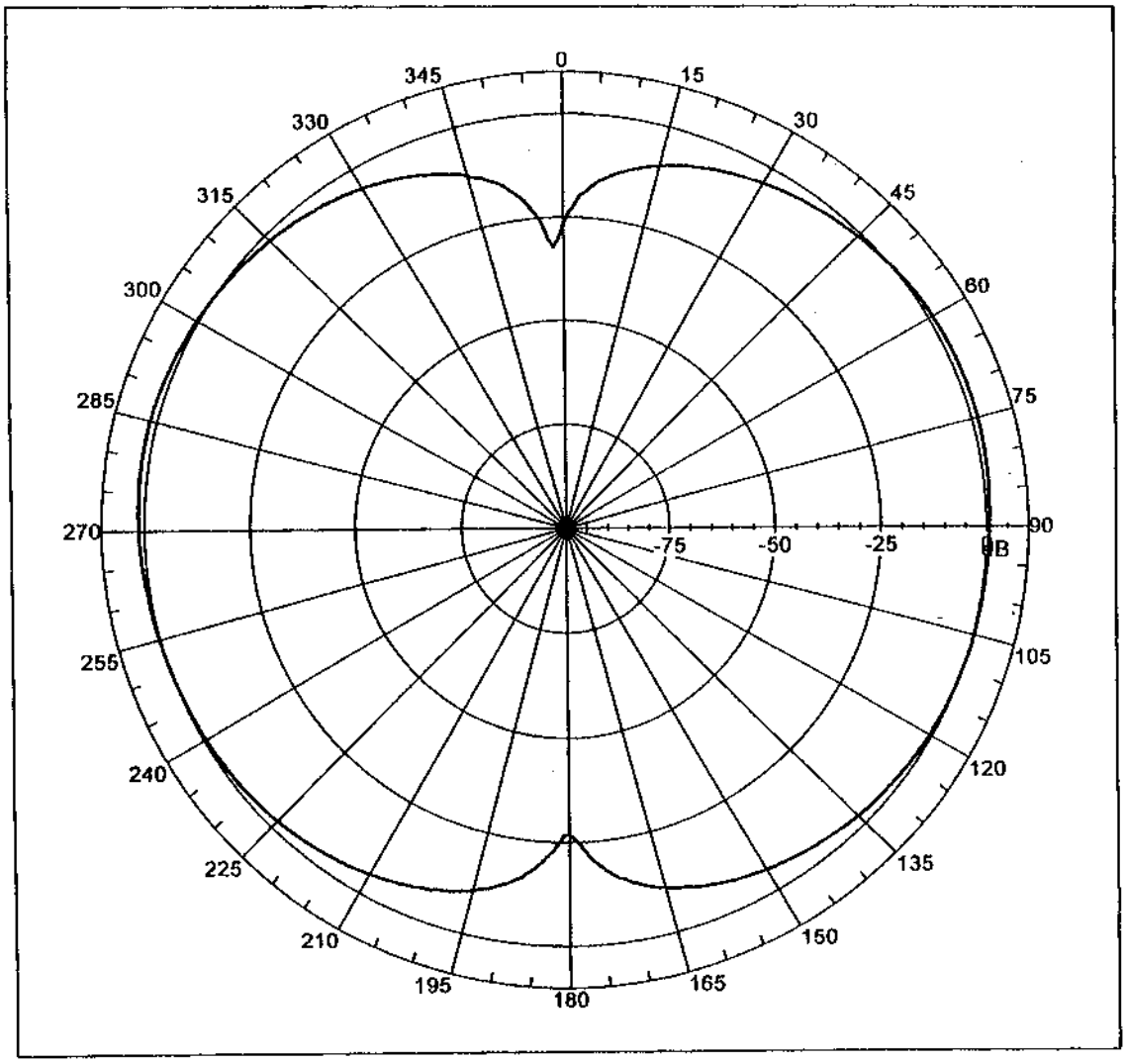
譁裕實業股份有限公司
WHA YU INDUSTRIAL CO., LTD

Far-field amplitude of 3dbi-origin.nsi



譁裕實業股份有限公司
WHA YU INDUSTRIAL CO., LTD

Far Field amplitude of 3dBi-Orgin E Plane



KURABE INDUSTRIAL CO., LTD

SP3830M-X	FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE (FWS 5022)	PAGE	1/4
PRODUCT STANDARD		ISSUED	17-9-2001
		REVISED	

1. SCOPE

This standard covers "FEP insulated High-Frequency coaxial cable".

2. CONSTRUCTION

Construction and dimensions of the cable are shown in Figure.1 and Table 1.

3. PERFORMANCE

Performance of the finished cable is shown in Table 2. The test methods are in accordance with applicable test methods described in JIS C 3005.

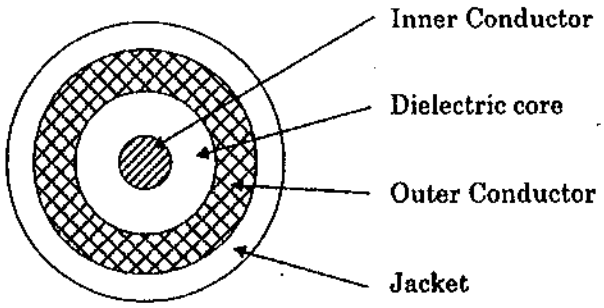


Figure 1.

NOTE :	MADE BY	M. Ohba
	APPROVALS	T. Nagawa

KURABE INDUSTRIAL CO., LTD

SP3830M-X	FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE (FWS 5022)	PAGE	2/4
PRODUCT STANDARD		ISSUED	17-9-2001
		REVISED	

Table 1. Construction

Item		Unit	Specified Value
Inner Conductor	Material	—	Silver coated annealed copper wire
	Stranding	No./mm	7/0.08
	Dia.(approx.)		0.24
Dielectric Core	Material	—	FEP
	Thick.(nom.)	mm	0.22
	Dia.	mm	0.68±0.05
	Color	—	Natural
Outer Conductor	Material	—	Silver coated annealed copper wire
	Type	—	Braid (16/4/0.05)
	Dia.(approx)	mm	0.93
Jacket	Material	—	FEP
	Thick.(nom.)	mm	0.10
	Dia.	mm	1.13 +0.10/-0.06
	Color	—	Standard colors are white,black,blue,brown,and gray.

Table 2. Performance

Item	Unit	Specified Value	Note
Appearance	—	Faultless in visible	—
Inner conductor resistance	Ω/km	Max.597	at 20℃
Insulation resistance	MΩ·km	Min.1500	at 20℃
Dielectric strength	—	Dielectric core: No breakdown at AC1.5kV for 0.15sec.	Spark test
		Jacket: No breakdown at AC1.5kV for 0.15sec.	Spark test
		No breakdown at AC500V for 1min.	Outer conductor to inner conductor
Heat resistance for solder	—	Shrink or expansion of dielectric core are not more than 0.5mm	※
Capacitance	pF/m	nom. 98	at 1kHz
Characteristic impedance	Ω	50±2	TDR method
Attenuation (nom.)	dB/m	2.0	1.0GHz
		2.9	2.0GHZ
		3.6	3.0GHz
		4.2	4.0GHz
		4.7	5.0GHz
		5.2	6.0GHz

※ After immersion of dielectric core, 10mm into soldering pot which is 230℃ for 5 seconds, shrinkage or expansion of the dielectric core must not exceed 0.5mm.

NOTE :	MADE BY	M. Ohba
	APPROVALS	T. Kawazoe

SP3830M-X	FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE (FWS 5022)	PAGE	3/4
PRODUCT STANDARD		ISSUED	17-9-2001
		REVISED	

4. INSPECTION

An inspection is took place in accordance with applicable test methods. The cable has to pass the specifications described Table 1 and Table 2.

5. TEST METHOD

The test methods are in accordance with applicable test methods described in JIS C 3005 (Test methods for rubber or plastic insulated wires and cables).

6. TEMPERATURE RATING

150 ℃

7. VOLATGE LATING

250 V

8. MARKING ON TAG

Each reel of finished cable is tagged to indicate following information:

(1) Designation of the cable,
(2) Conductor size,
(3) Length,
(4) Date of manufacture or LOT No.,
(5) Specification No., and
(6) Manufacture's name.

9. PACKAGE

The finished cables are cut into a shipping length of 200 meters, reeled to paper bobbin and packed securely to prevent injuries during transportation. Odd length of the finished wires should be accepted for shipping according to the condition of mutual agreement.

In the case no agreement is found, the condition stated in quotation shall prevail.

10. APPLICATION NOTES

10-1. For use other than the use mutually agreed, compatibility should be carefully confirmed in each practical use by user.

10-2. It is recommended to make a trial run for each practical application.

NOTE :	MADE BY	M. Ohba
	APPROVALS	T. Kawasumi

SP3830M-X	FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE (FWS 5022)	PAGE	4/4
PRODUCT STANDARD		ISSUED	17-9-2001
		REVISED	

10-3. In case a design for use of cable is changed, please contact our sales department, if necessary. Do not use under extreme mechanical stress such as hard bending, tightening, and twisting. The use under extreme mechanical stress may cause not only shortening the life span of cable but also troubles such as decline of dielectric strength.

10-4. Handling precautions

①Do not hurt the insulation and sheath of the cable by making holes and scratches. And avoid any sharp edge when wiring so as not to injure cables.

②Avoid unnecessary excessive force to cable, such as pulling, twisting, bending or tightening.

10-5. Storage precautions

Avoid continuous exposure to sunlight.

NOTE :	MADE BY	M. Ohba
	APPROVALS	T. Kawazawa

Arnitel
polyether esters
polyetherester
esters de polyether

天線桿套材質特性表

Units Einheiten Unites	EM400	EM460	EL550	EL630	EL740	PL380
	1.12	1.16	1.20	1.23	1.27	1.18
℃	195	185	202	212	221	197
μm/m.k	220	160	180	140	110	150
℃	\	\	110	115	120	\
℃	130	150	180	200	200	145
℃	\	50	85	115	150	\
%	0.30	0.30	0.20	0.20	0.15	0.40
%	0.75	0.70	0.55	0.60	0.90	7.0
*	HB	HB	HB	HB	HB	HB
Mpa	55	110	220	375	900	60
Mpa	4.0	7.1	13.2	20.2	26.9	3.5
Mpa	5.4	9.0	15.7	23	22.6	5.2
Mpa	8.4	11.4	16.6	22.0	26.3	8.5
Mpa	17	21	32	40	45	16
%	700	800	600	600	360	450
kj/m²	NB	NB	NB	NB	NB	NB
kj/m²	NB	NB	NB	NB	200	NB
kj/m²	NB	NB	NB	NB	9	NB
kj/m²	NB	NB	20	4	4	NB
	38	45	55	63	74	38
MV/m	\	\	\	\	\	\
Ω.cm	$5*10^{14}$	10^{14}	10^{14}	10^{14}	10^{12}	10^{12}
Ω	$>10^{13}$	$>10^{14}$	$>10^{14}$	$>10^{14}$	$>10^{10}$	$>10^{13}$
\	4.1	\	\	3.8	\	4.7
\	4.0	4.4	4.0	3.4	3.3	4.4
$x10^{14}$	10	\	\	3.8	\	310
$x10^{14}$	170	350	400	350	300	350
\	800	800	600	600	600	800
\	600	600	600	800	800	600

2.2 Product coding

The structure of the Arnitel productcodes is illustrated wirth the following example:

U M 55 1 - V

Thermoplastic elastomer type:
E = polyether ester; polyether = PTHF
P = polyether ester; polyether = PEO/PPO
U = polyester ester; (with extra urethane linkages)

Indication of viscosity range or processing technique
L, M = injection moulding and extrusion
B = blow moulding grade

Indication of hardness (Shore D)

Serial number

Indication of additives, perfomance
H = heat-stabilized
L = light/UV stabilized
V = flame-retardant (not V-0)
S = flame-retardant (V-0)

Figure 2.2: *Arnitel product coding*

2.3 Product portfolio

The Arnitel productrange is available with a hardness from 38 to 74 Shore D. The general Arnitel grades are shown in table 2.2. In order to enhance the flexibility of the portfolio a set of masterbatches (a.o. for heat, UV, etc) are on offer (refer to § 2.4).
Because of the development of these masterbatches heat stabilised Arnitel P is suggested for application areas where thermo-oxidative stability is an issue. For applications where colour and UV stability is required, the Arnitel E range is advised.

	Shore D					
	38	**40**	**46**	**55**	**63**	**74**
Arnitel E		EM400	EM460	EL550 EM550	EL630 EM630	EL740 EM740
Arnitel P	PL380		PL460	PL580 PM581		
Arnitel U				UM551 UM551-V UM552 UM552-V	UM622	

Table 2.2: *Arnitel productrange for general purpose*

Besides these multi-purpose grades, specialty grades can be offered for specific purposes and/or application areas. These grades are not intended for regular sales and are therefore restricted. Permission from marketing is needed before sampling is initiated.

	A'tel E	**A'tel P**	**A'tel U**
Automotive			
• CVJ boots	EB460 EB463 EB464		
• Boyplugs		PL380-M0	
Extrusion			
• Roofing foil	EM402-L		

Table 2.3: *Examples of specialty grades*

2.8.31 General:
Arnitel is the brand name of a series polyester based thermoplastic elastomers. These polymers combine excellent processability with good elastomeric properties between -40 and 200°C. Arnitel EL630 and EM630 are excellent materials for injection moulding and extrusion applications respectively.
The chemical stucture of Arnitel EL630/EM630 is shown below.

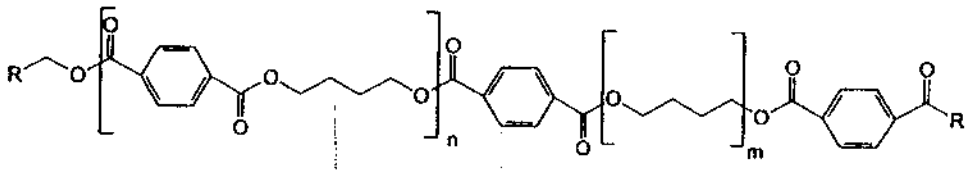


Figure 2.9: *Chemical structure of Arnitel EL630/EM630.*

Another way of writing the structure of Arnitels is shown below in Figure 2.

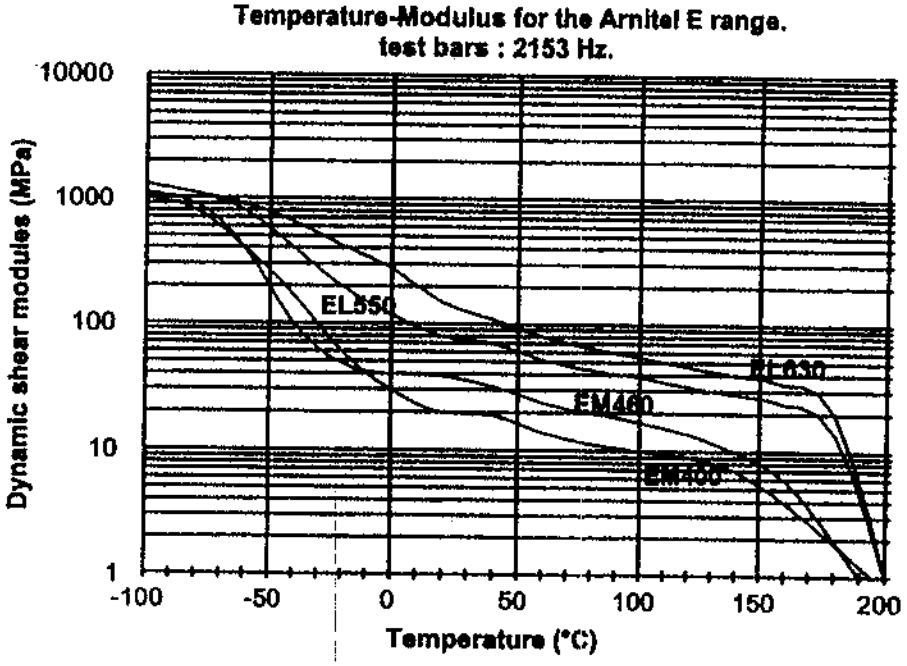
Figure 2.10: *Simplified structure of Arnitel EL630/EM630 .*

Arnitel EL630/EM630 is TOSCA registered (including DSL-Canada) under CAS 37282-12-5

2.8.32 Thermal properties:

- **Modulus-temperature behaviour:**

The materials have a glass transition at circa -40°C and a typical melting point at 213°C.
The modulus-temperature behaviour is shown in graph 2.76, for comparison, accompanied by other Arnitel E types.



Graph 2.76: *Modulus-temperature behaviour of Arnitel EL630/EM630.*

Although information on performance at higher temperatures may be extracted from the above shown graph, a Vicat or HDT are shown in table 2.29.

analysis	SI unit	typical data	test method
Vicat A	(°C)	200	ISO 306/A
Vicat B	(°C)	125	ISO 306/B
HDT-B	(°C)	115	ISO 75-1

Table 2.29: *Vicat and HDT data on Arnitel® EL630 and EM630*

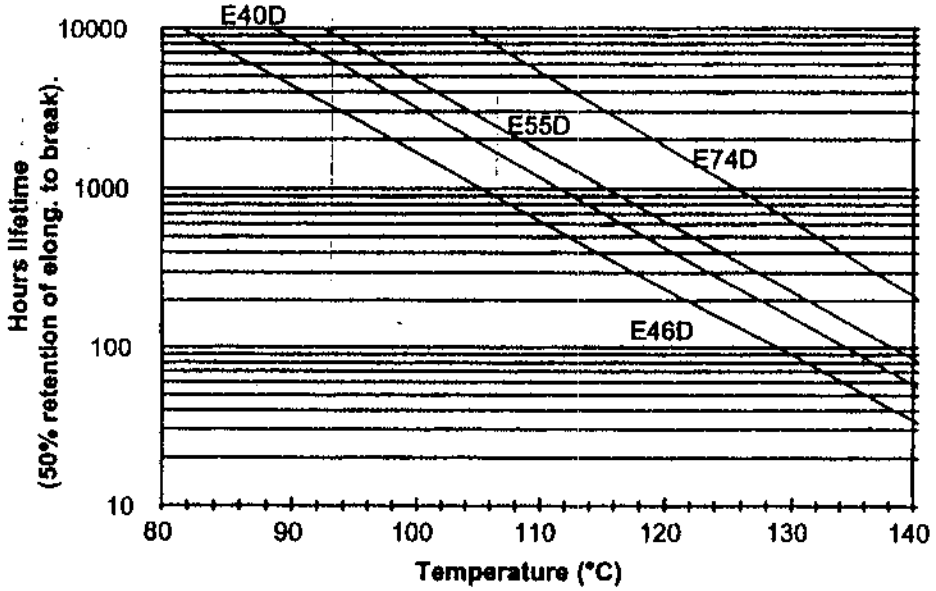
Arnitel EL630 and EM630 have a melting point of 213°C as found in the second heating curve of a DSC. The polymer will crystallize at 155°C using a 20°C/min cooling rate.
The thermal expansion coefficient of Arnitel EL630/EM630 and is $140*10^{-4}$ µm/m.K .

- **Heat aging:**

Arnitel EL630/EM630 shows an optimum between heat resistance and colour stability. Heat aging for EL630/EM630 is under test at this moment, however the data will be between EL550 and EL740. Arrhenius curves of thermo-oxidative heat aging are shown in graph 2.77. Criterium chosen is retention of 50% original elongation at break.

Heat aging of Arnitel E40D, 46D, 55D and 74D.

Natural products, Arrhenius plot.



Graph 2.77: *Heat stability for Arnitel E-range.*

Heat ageing can be improve using a stabilisation masterbatch, however for heat stabilisation the P-range is preferred for it's excellence in performance. These data can be found in the Arnitel properties summary or an Arnitel P datasheet.

2.8.33 Processing and Handling:

Arnitel EL630/EM630 is a polyester with a density of 1.12 g/cm^3 according ISO 1183.
Due to the polyester nature of these materials it is of major importance to store the material dry prior to processing. Materials packaged in sealed packaging should have a moisture content lower then 500 ppm. The polymer will contain 0.12% moisture in 50% RH and 0.58% water after saturation in water. Both numbers are in equilibrium.
If samples have become wet during storage a drying step of 24 hours 120°C (or 6 hours 140°C) prior to use will prevent degradation of the material during processing combined with an eventual loss of properties. The air or nitrogen will have to have a dew point of at least -30°C.

- **Processing:**

Arnitel EL630/EM630 shows a single melting point at 195°C in DSC. Processing conditions are shown in the table below.

polymer	zone 1	zone 2	zone 3	additional	melt	mold
EL630	225	230	235	235	225-235	20-50
EM630	225	230	235	235	235	50

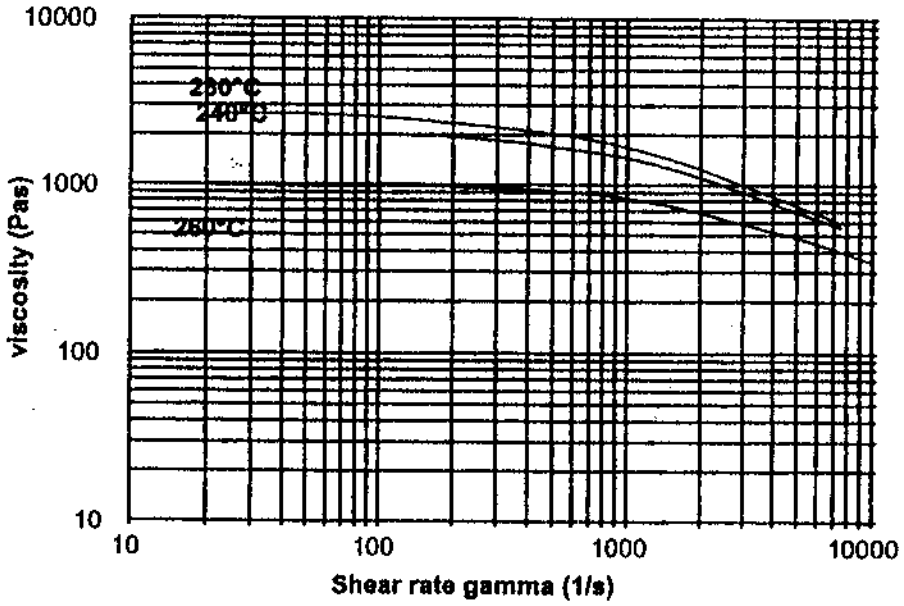
All temperatures are in °C.

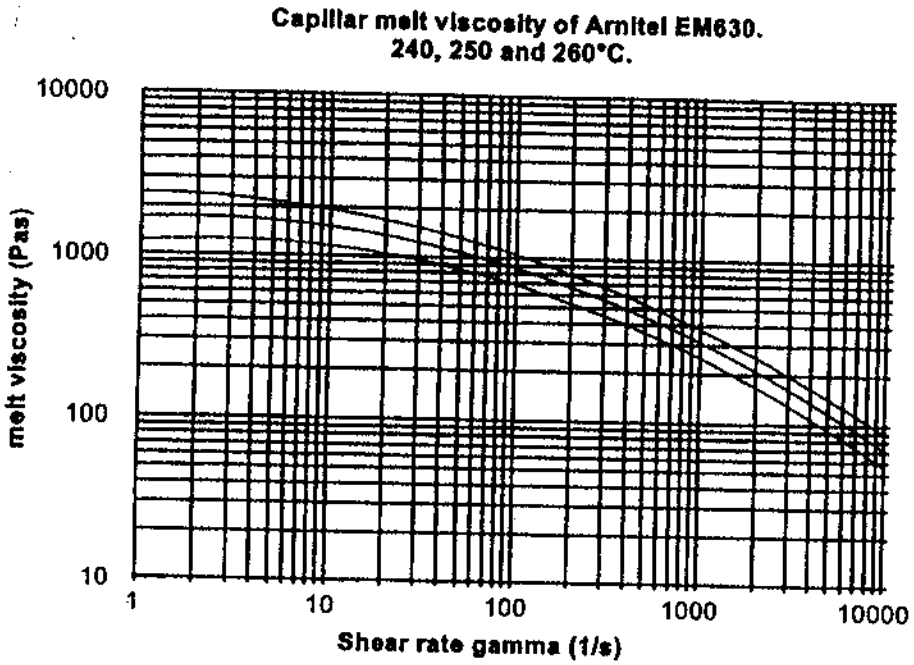
Table 2.30: *Processing conditions for Arnitel EL630 and Arnitel EM630.*

- **Rheology:**

The temperature depending melt viscosity of Arnitel EL630/EM630 and are shown below in graph 2.80 and 2.81 respectively.

Shear rate dependent of the melt viscosity of Arnitel EL630.
Effect of melt temperature.





Graph 2.80 and 2.81: *Temperature dependancy of the melt viscosity for Arnitel EL630 and EM630 .*

The MFI values are shown in table 2.31.

		EL630	EM630	
MFI 230°C	g/10 min		7	ISO 1133
MFI 240°C	g/10 min	30		ISO 1133

Table 2.31: *MFI for Arnitel EL630/EM630.*

- **Use of regrind:**

Arnitel can readily be recycled. If the MFI of the regrind is up or down to four points higher, 20% can be recycled. A difference of 2 MFI points allows up to 50% of regrind. Obviously the regrind should be dried properly before use.

2.8.34 Mechanical properties:

If Arnitel EL630 or Arnitel EM630 are processed properly the materials will have mechanical properties as shown in table 2.32.

Mechanical property	SI Unit	typica data*		test method
		EL630	EM630	
Hardness	Shore D	63	63	ISO 868
Tensile modulus (1 mm/min)	MPa	330	330	ISO 527
Tensile strength (50 mm/min)	MPa	30	30	ISO 527
Strain at break	%	350	350	ISO 527
Tensile stress at 5% strain	Mpa	11.5	11.5	
Tensile stress at 10% strain	Mpa	15.9	15.9	
Tensile stress at 50% strain	Mpa	17.3	17.3	
Tear strength Graves	KN/m	145	145	DIN53515
Izod notched 23°C (73°F)	KJ/m²	NB	NB	ISO 180/1A
Izod notched -30°C (-22°F)	KJ/m²	4	4	ISO 180/1A
Charpy notched 23°C (73°F)	KJ/m²	NB	NB	ISO 179/1eA
Charpy notched -30°C (-22°F)	KJ/m²	12	12	ISO 179/1eA

*1 Data for dry natural materials.
NB: No Break

Table 2.32: *mechanical properties of Arnitel® EL630.*

• **Abrasion:**
Arnitels show good abrasion resistance in both Taber and DIN 53516 abrasion tests. Data are shoen in the Arnitel general property overview (also included in the EPIC)

2.8.35 Flame retardancy:
Arnitel EL630 and EM630 show in an ISO1210/A flammability test a burning rate leading to a classification FH-1. Flame retardancy can be improved using a halogenated or halogen free FR masterbatch.

2.8.36 Electrical properties:
Arnitel EL630/EM630 can be used for cable jacketting applications. If the material is in permanent contact with copper a copper stabilisation package should be added. If the copper wires are coated with a tin layer, no stabilisation is necessary. The electrical properties are shown in table 33.

Electrical property	SI Unit	typica data*		test method
		EL630	EM630	
Dielectric strength	KV/mm	22	22	IEC 243-1
Relative permittivity (ε_r) at 1 kHz	-	4.4	4.4	IEC 250
Dissipation factor (tan δ) at 1kHz	-	0.019	0.019	IEC 250
Comparative tracking index	-	600	600	IEC 112
Volume resistivity	$10^{14}\Omega$.cm	1	1	IEC 93
Surface resistivity	$10^{14}\Omega$	1	1	IEC 93

Table 2.33: *Typical electrical properties of Arnitel® EL630 and EM630.*

2.8.37 Chemical resistance:
Arnitel EL630 and EM630 are sensitive to strong bases and strong acids, especially at elevated temperatures. In some halogenated hydrocarbons (like tetrachloroethane), the materials (partially) dissolves. For a full review on chemical resistance of Arnitel EL630 and EM630 request the chemical resistance brochure.

• **Hydrolysis**
Like all polyesters Arnitel are sensitive to moisture, however Arnitels are more stable to water then e.g. PET and PBT. graph 2.84 shows the hydrolytic stability of Arnitel EL630 at 100°C and in steam (120°C). For improved hydrolysis stability, using a polycarbodiimid containing masterbatch like Stabaxol® in an option. To maintain all other properties use a masterbatch based on polyester.Data on the Stabaxol stabilised grade are shown in graph 2.85.

GE Plastics

LEXAN 123R

USA: Commerci

Product Portfolio | Product Lines | LEXAN

Nonhalogenated. 17.5 MFR, for small, intricate parts. UV stabilized. Internal mold release.

Processing

INJECTION MOULDING-USA

Melt Temperature	540 580	deg F
Nozzle Temperature	530 570	deg F
Front Temperature	540 580	deg F
Middle Temperature	520 560	deg F
Rear Temperature	500 540	deg F
Mold Temperature	160 200	deg F
Drying Temperature	250	deg F
Drying Time (minimum)	3 4	h
Drying Time (maximum)	48	h
Back Pressure	50 100	psi
Screw Speed	40 70	rpm
Suggested shot size	40 60	%
Vent Depth	.001 .003	in

Source Eris. last updated: 1997/0

Nonhalogenated. 17.5 MFR. for small. intricate parts. UV stabilized. Internal mold release.

MECHANICAL

Property	Typical Data	Unit	Method
Tensile Strength, yield, Type I, 0.125"	9000	psi	ASTM D 638
Tensile Strength, break, Type I, 0.125"	9500	psi	ASTM D 638
Tensile Elongation, yield, Type I 0.125"	7.0	%	ASTM D 638
Tensile Elongation, break, Type I 0.125"	110.0	%	ASTM D 638
Flexural Strength, yield, 0.125"	13500	psi	ASTM D 790
Flexural Modulus, 0.125"	340000	psi	ASTM D 790
Compressive Strength	12500	psi	ASTM D 695
Compressive Modulus	345000	psi	ASTM D 695
Shear Strength	10000	psi	ASTM D 732
Shear Modulus	114000	psi	ASTM D 4065
Hardness, Rockwell M	70		ASTM D 785
Hardness, Rockwell R	118		ASTM D 785
Taber Abrasion, CS 17, 1 kg	10	mg/1000cy	ASTM D 1044
Fatigue Limit, 2.5 MM cycles	1000	psi	ASTM D 671

IMPACT

Property	Typical Data	Unit	Method
Izod Impact, unnotched, 73F	60.0	ft lb/in	ASTM D 4812
Izod Impact, notched, 73F	13.0	ft lb/in	ASTM D 256
Tensile Impact, Type "S"	260	ft lb/in2	ASTM D 1822
Falling Dart Impact (D 3029), 73F	125	ft lbs	ASTM D 3029

THERMAL

Property	Typical Data	Unit	Method
Vicat Softening Temp, Rate B	310	deg F	ASTM D 1525
HDT, 66 psi, 0.250", unannealed	280	deg F	ASTM D 648
HDT, 264 psi, 0.250", unannealed	270	deg F	ASTM D 648
Thermal Conductivity	0.19	W/m C	ASTM C 177
CTE, flow, 40F to 200F	3 E 5	in/in F	ASTM E 831
Specific Heat	0.30	BTU/lb F	ASTM C 351
Thermal Index, Elec Prop	100	deg C	UL 746B
Thermal Index, Mech Prop with impact	100	deg C	UL 746B
Thermal Index, Mech prop without impact	100	deg C	UL 746B
Brittleness Temperature	200	deg F	ASTM D 746

PHYSICAL

Property	Typical Data	Unit	Method
Specific Gravity, solid	1.20	-	ASTM D 792
Specific Volume	23.10	in3/lb	ASTM D 792
Density	0.043	lb/in3	ASTM D 792
Water Absorption, 24 hours @ 73F	0.150	%	ASTM D 570
Water Absorption, equilibrium, 73F	0.35	%	ASTM D 570
Water Absorption, equilibrium, 212F	0.58	%	ASTM D 570
Mold Shrinkage, flow, 0.125"	5-7	in/in E-3	ASTM D 955
Melt Flow Rate, nom'l, 300C/1.2 kgf (O)	17.5	g/10 min	ASTM D 1238

OPTICAL

Property	Typical Data	Unit	Method
Light Transmission, 0.100"	88.0	%	ASTM D 1003
Haze, 0.100"	1.0	%	ASTM D 1003
Refractive Index	1.586	-	ASTM D 542

ELECTRICAL

Property	Typical Data	Unit	Method
Volume Resistivity	>1E17	ohm-cm	ASTM D 257
Dielectric Strength, in air, 125 mils	380	V/mil	ASTM D 149
Dielectric Constant, 60 Hz	3.17	-	ASTM D 150
Dielectric Constant, 1 MHz	2.96	-	ASTM D 150
Dissipation Factor, 60 Hz	0.0009	-	ASTM D 150
Dissipation Factor, 1 MHz	0.0100	-	ASTM D 150

FLAME CHARACTERISTICS

Property	Typical Data	Unit	Method
UL File Number, USA	E121562	-	-
HB Rated (tested thickness)	0.058	inch	UL 94

Source Eris, last updated: 1998/1

Disclaimer

The values shown on the attached pages are typical values that have been obtained using test bars from typical lo and are not intended for specification purposes. These values are for natural colors only. Addition of pigments m alter some values. Inasmuch as the General Electric Company has no control over the use to which others may pu the material, it does not guarantee that the same results as those described herein will be obtained. Each user of tl material should make his own test to determine the material's suitability for his own particular use. Statements concerning possible or suggested uses of the materials described herein are not to be construed as constituting a license under any General Electric patent covering such use or as recommendations for use of such materials in tl infringement of any patent.

PRODUCT SPECIFICATION
製 品 規 格

No. PRS-1176

MHF series micro coaxial connector

Qualification Test Report No. TR-1021

REV.	ECN	BY	DATE	APP.	Prepared by	Reviewed by	Approved by
2	S2031	K.O	May/17/'02	K.K	K.Ohbayashi JUN / 25 / 01	E,Kawabe Jun / 25 / 01	K.Katabuchi Jun / 29 / 01
1	S1053	K.O	Nov/14/'01	K.K			
0	S1025	K.O	Jun/25/'01				
REVISION RECORD							

DOCUMENT CLASSIFICATION	TITLE	No.
Product Specification 製品規格	MHF series micro coaxial connector	PRS-1176

1. Scope ／ 序言

MHF series micro coaxial connector is a wire to board connector for AWG#36,32,30 coaxial cable .
MHF series micro coaxial connector は、AWG＃36,32,30同軸ケーブルの基板対ワイヤーコネクタである。

2. Objectives ／ 目的

This specification covers the requirements for product performance and test methods of MHF series microcoaxial connector
本規格は、MHF series micro coaxial connector の性能と試験条件について規定する。

3. Part No. , construction , material and finish ／ 構成、材料及び仕上げ

(1) Part No. Plug : 20278-＊＊＊R-08,-13,-18 , Receptacle : 20279-001E-01
(2) Construction, material and finish of the connector are covered as each drawings.
構成、材料及び仕上げは、各図面に指定されている通りとする。

4. Applicable cable ／ 適合ケーブル

4-1 Part No. 20278-001R-08, 20278-011R-08

(1) Description

Inner conductor : AWG#36(7/0.05)
Silver plating annealed copper wire or silver plating tin-copper alloy
Dielectric core : Fluoro-plastics ,diameter 0.4(+0.04,-0.02)mm , nominal thickness 0.125mm
Outer conductor : 8/5/0.05 , nominal diameter 0.65mm , silver plating annealed copper wire
Jacket : Fluoro-plastics , diameter 0.81(+0.04,-0.02)mm , nominal thickness 0.08mm

(2) Requirements

Characteristic impedance : 50(+3,-3)ohm by TDR method (raise time 40ps)
Nominal capacitance: 96 pF/m
Conductor resistance of inner conductor at 293K (20℃) : 1400 ohm/km MAX.
Insulation resistance : 1000 mega-ohm.km MIN.
Dielectric withstand voltage : no breakdown at AC1000V for 1 minutes.

(1) 構成

中心導体 ： AWG＃36(7／0. 05),銀メッキ軟銅線または銀メッキすず入り銅線
誘電体 ： フッ素樹脂,外径0. 4(＋0. 04,－0. 02),標準厚さ0. 125mm
外部導体 ： 8／5／0. 05,標準外径0. 65mm, 銀メッキ軟銅線
ジャケット ： フッ素樹脂,外径0. 81(＋0. 04,－0. 02)mm, 標準厚さ0. 08mm

(2) 仕様

特性インピーダンス ： 50±3Ω (TDR,ライズタイム40ps)
標準静電容量 ： 96pF／m
293K(20℃)時の中心導体導体抵抗 ： 1400Ω ／km以下
絶縁抵抗 ： 1000MΩ ・km以上
耐電圧 ： AC1000V・1分間にて絶縁破壊の無い事

4-2 Part No. 20278-101R-13, 20278-111R-13

(1) Description

Inner conductor : AWG#32(7/0.08)
Silver plating annealed copper wire or silver plating tin-copper alloy
Dielectric core : Fluoro-plastics , diameter 0.68(+0.04,-0.02)mm , nominal thickness 0.22mm
Outer conductor : 16/4/0.05 , nominal diameter 0.93mm , silver plating annealed copper wire
Jacket : Fluoro-plastics , diameter 1.13(+0.08,-0.05)mm , nominal thickness 0.1mm

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(2) Requirements
Characteristic impedance : 50(+2,-2)ohm by TDR method (raise time 40ps)
Nominal capacitance: 97 pF/m
Conductor resistance of inner conductor at 293K (20℃) : 520 ohm/km MAX.
Insulation resistance : 1500 mega-ohm.km MIN.
Dielectric withstand voltage : no breakdown at AC1000V for 1 minutes.

(1) 構成
中心導体 ： AWG＃32(7／0. 08),銀メッキ軟銅線または銀メッキすず入り銅線
誘電体 ： フッ素樹脂,外径0. 68(＋0. 04,－0. 02),標準厚さ0. 22mm
外部導体 ： 16／4／0. 05,標準外径0. 93mm, 銀メッキ軟銅線
ジャケット ： フッ素樹脂,外径1. 13(＋0. 08,－0. 05)mm, 標準厚さ0. 1mm

(2) 仕様
特性インピーダンス ： 50±2Ω (TDR,ライズタイム40ps)
標準静電容量 ： 97pF／m
293K(20℃)時の中心導体導体抵抗 ： 520Ω ／km以下
絶縁抵抗 ： 1500MΩ ・km以上
耐電圧 ： AC1000V・1分間にて絶縁破壊の無い事

4-3 Part No. 20278-001R-32, 20278-011R-32

(1) Description
Inner conductor : AWG#32(7/0.08)
Silver plating annealed copper wire or silver plating tin-copper alloy
Dielectric core : Fluoro-plastics , diameter 0.66(+0.05,-0.05)mm , nominal thickness 0.21mm
First outer conductor : 16/5/0.05, tin plating annealed copper wire
Second outer conductor :16/6/0.05, nominal diameter 1.12mm , tin plating annealed copper wire
Jacket : Fluoro-plastics , diameter 1.32(+0.1,-0.1)mm , nominal thickness 0.1mm

(2) Requirements
Characteristic impedance : 50(+2,-2)ohm by TDR method (raise time 40ps)
Nominal capacitance: 95 pF/m
Conductor resistance of inner conductor at 293K (20℃) : 520 ohm/km MAX.
Insulation resistance : 1500 mega-ohm.km MIN.
Dielectric withstand voltage : no breakdown at AC1000V for 1 minutes.

(1) 構成
中心導体 ： AWG＃32(7／0. 08),銀メッキ軟銅線または銀メッキすず入り銅線
誘電体 ： フッ素樹脂,外径0. 66(＋0. 05,－0. 05),標準厚さ0. 21mm
外部導体(内側) ： 16／5／0. 05,すずメッキ軟銅線
外部導体(外側) ： 16／6／0. 05,標準外径1. 12mm, すずメッキ軟銅線
ジャケット ： フッ素樹脂,外径1. 32(＋0. 1,－0. 1)mm, 標準厚さ0. 1mm

(2) 仕様
特性インピーダンス ： 50±2Ω (TDR,ライズタイム40ps)
標準静電容量 ： 95pF／m
293K(20℃)時の中心導体導体抵抗 ： 520Ω ／km以下
絶縁抵抗 ： 1500MΩ ・km以上
耐電圧 ： AC1000V・1分間にて絶縁破壊の無い事

DOCUMENT CLASSIFICATION	TITLE	No.
Product Specification 製品規格	MHF series micro coaxial connector	PRS-1176

4-4 Part No. 20278-001R-18, 20278-011R-18
RG178 B/U

(1) Description

Inner conductor : AWG#30(7/0.102) , silver plating copper clad steel wire
Dielectric core : Fluoro-plastics , diameter 0.84(+0.03,-0.03)mm , nominal thickness 0.268mm
Outer conductor : 16/3/0.1 , nominal diameter 1.35mm , silver plating copper wire
Jacket : Fluoro-plastics , diameter 1.8(+0.1,-0.1)mm , nominal thickness 0.23mm

(2) Requirements

Characteristic impedance : 50(+2,-2)ohm by TDR method (raise time 40ps)
Nominal capacitance: 95 pF/m
Conductor resistance of inner conductor at 293K (20℃) : 805 ohm/km MAX.
Insulation resistance : 1500 mega-ohm.km MIN.
Dielectric withstand voltage : no breakdown at AC2000V for 1 minutes.

(1) 構成

中心導体 : AWG＃30(7／0. 102),銀メッキ銅被鋼線
誘電体 : フッ素樹脂,外径0. 84(±0. 03),標準厚さ0. 268mm
外部導体 : 16／3／0. 1,標準外径1. 35mm, 銀メッキ軟銅線
ジャケット : フッ素樹脂,外径1. 8(±0. 1)mm, 標準厚さ0. 23mm

(2) 仕様

特性インピーダンス : 50±2Ω (TDR,ライズタイム40ps)
標準静電容量 : 95pF／m
293K(20℃)時の中心導体導体抵抗 : 805Ω ／km以下
絶縁抵抗 : 1500MΩ ・km以上
耐電圧 : AC2000V・1分間にて絶縁破壊の無い事

5. Ratings ／ 定格

(1) Rated voltage / 電圧 : AC60Vrms
(2) Nominal characteristic impedance／公称特性インピーダンス : 50Ω
(3) Frequency / 周波数 : DC～3GHz
(4) VSWR : 1. 3 MAX.
(5) Service Temperature / 使用温度範囲 : 233～363K(－40～＋90℃)

6. Test methods and performance ／ 試験及び性能

6-1 Test condition / 試験条件

Unless otherwise specified, all tests and measurements shall be performed under the following conditions in accordance with MIL-STD-202
全ての測定と試験は、MIL-STD-202 に基づき以下の条件で行う。.

Temperature / 温度 : 288～308K (15～35℃)
Humidity / 湿度 : 45～75%RH

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6-2 Sample quantity / 試料数

(1) Insulation resistance / 絶縁抵抗 : 10pcs.
(2) Dielectric withstanding voltage / 耐電圧 : 10pcs.
(3) VSWR : 5pcs.
(4) Unmating force / 抜去力 : 10pcs
(5) Durability / 耐久性 : 10pcs.
(6) Cable retention force / ケーブル保持力 : 10pcs.
(7) Vibration / 振動 : 10pcs.
(8) Shock / 衝撃 : 10pcs.
(9) Thermal shock / 温度サイクル : 10pcs.
(10) Humidity / 湿度 : 10pcs.
(11) Salt water spray / 塩水噴霧 : 10pcs.
(12) Solderability / 半田付け性 : 10pcs.
(13) Reflow soldering heat resistance / 半田耐熱性 : 10pcs.

6-3-1 Electrical / 電気的性能
(1) Contact Resistance / 接触抵抗

A.Testing:Solder the receptacle connector to the test board and mate the plug connector together, then measure the contact resistance as shown in Fig.1 by the four terminal method.
Apply the low level condition in accordance with MIL-STD-202, Method 307.
Open circuit voltage : 20mV MAX
Circuit current : 10mA MAX. (DC or AC1kHz)
Contact resistance of inner contact : <resistance of A-E> - <resistance of B-E>
Contact resistance of ground contact : <resistance of A-D> - <resistance of B-D>

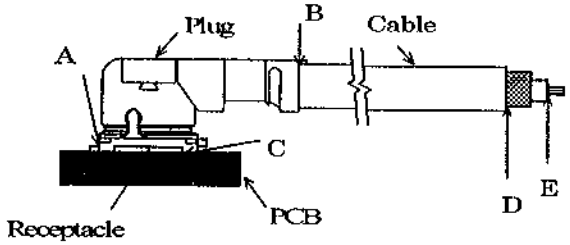

Fig.1

B.Requirements :
Contact resistance of inner contact initial 20 milli-ohm MAX. after testing 25milli-ohm MAX.
Contact resistance of ground contact initial 10 milli-ohm MAX. after testing 15milli-ohm MAX.

A.試験法:テスト基板にリセプタクルコネクタを半田付けし、プラグコネクタと嵌合させ、Fig. 1のように4端子法にて下記の条件で測定する。 MIL-STD-202 試験法 307 に準拠。
開回路電圧: 20mV以下
試験電流 : 10mA(DCもしくはAC1kHz)
中心導体 : <A－E間の電気抵抗>－<B－E間の電気抵抗>
外部導体 : <A－D間の電気抵抗>－<B－D間の電気抵抗>
B.必要条件: 中心導体 初期 20mΩ 以下, 試験後 25mΩ 以下
外部導体 初期 10mΩ 以下, 試験後 15mΩ 以下

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(2) Insulation resistance / 絶縁抵抗

A. Testing : Mate the plug and receptacle connector together, then apply DC 100 V between the inner contact and the ground contact in accordance with MIL-STD-202, Method 302.

B.Requirements : Initial 500 Mohm MIN. after testing 100 Mohm MIN.

A.試験法: リセプタクル及びプラグコネクタを互いに嵌合させ、中心導体と外部導体の間に DC 100Vを印加し、測定する。MIL-STD-202 試験法 302 に準拠。

B.必要条件: 初期 500MΩ 以上 試験後 100MΩ 以上

(3) Dielectric withstanding voltage / 耐電圧

A. Testing : Mate the receptacle and plug connector together, then apply AC 200 Vrms between the inner contact and the ground contact for a minute in accordance with MIL-STD-202, Method 301.

B.Requirements : No creeping discharge, flashover, nor insulator breakdown shall occur.

A.試験法: リセプタクル及びプラグコネクタを互いに嵌合させ、中心導体と外部導体の間にAC200V(実効値)を一分間印加する。 MIL-STD-202 試験法 301 に準拠。

B.必要条件: 沿面放電、空中放電、絶縁破壊等の異常のないこと。

(4) VSWR

A. Testing : Measure the VSWR as shown in Fig.3 by the network analyzer.

Frequency :100M~3GHz

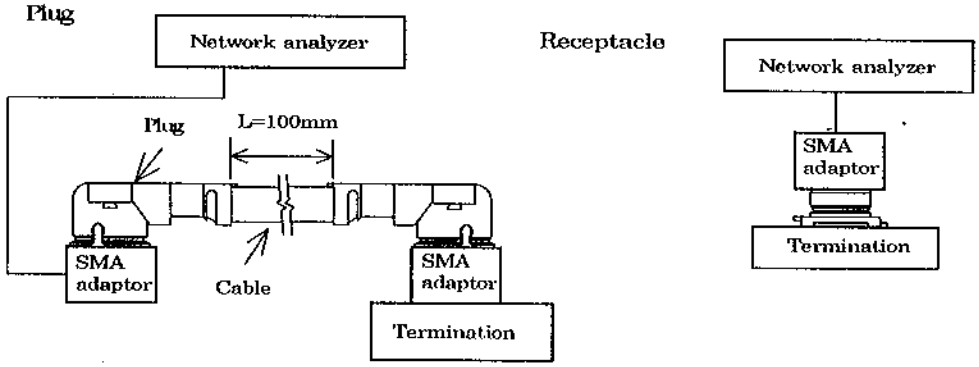

Fig.3

B.Requirements : 1.3 MAX.

A.試験法: ネットワークアナライザーにて Fig.3 のようにVSWRを測定する。
周波数 : 100M～3GHz

B.必要条件: 1．3以下

6-3-2 Mechanical / 機械的性能

(1) Unmating force / 抜去力

A. Testing : Unmate the receptacle connector (soldered to the test board) and plug at a speed 25±3mm/minutes along the mating by the push-on/pull-off machine .

B.Requirements :

Total unmating force : Initial 5N MIN. after 30 cycles 3N MIN.

Unmating force of inner contact : Initial 0.15N MIN. after 30 cycles 0.1N MIN

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A.試験法:挿抜試験機を用いて、基板に半田付けしたリセプタクルとプラグを嵌合軸と平行に毎分25±3mmの速度で挿抜する。

B.必要条件:

総合抜去力:初回抜去力 5N以上 ,30回後抜去力 3N以上

中心導体 :初回抜去力 0.15N以上 ,30回後抜去力 0.1N以上

(2) Durability / 耐久性

A. Testing : Mate and umate the receptacle connector (soldered to the test board) and plug 30 cycles at a speed 25±3mm/minutes along the mating by the push-on/pull-off machine .

B.Requirements :

Contact resistance of inner contact initial 20 milli-ohm MAX. after testing 25milli-ohm MAX.

Contact resistance of ground contact initial 10 milli-ohm MAX. after testing 15milli-ohm MAX.

A.試験法:挿抜試験機を用いて、基板に半田付けしたリセプタクルとプラグを嵌合軸と平行に毎分25±3mmの速度で30回挿抜する。

B.必要条件 中心導体接触抵抗 : 初期 20mΩ 以下, 試験後 25mΩ 以下

外部導体接触抵抗 : 初期 10mΩ 以下, 試験後 15mΩ 以下

(3) Cable retention force / ケーブル保持力

A. Testing : Apply force on the cable as shown in Fig.2.

During the testing, run 100mA DC to check electrical discontinuity.

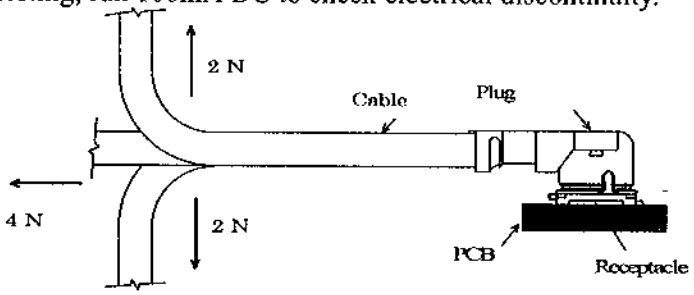

Fig.2

B.Requirements

Appearance : Looseness between the parts, chipping, breakage or other abnormality shall not occur.

Electrical discontinuity : No electrical discontinuity grater than 1 micro-sec. shall occur.

Contact resistance of inner contact initial 20 milli-ohm MAX. after testing 25milli-ohm MAX.

Contact resistance of ground contact initial 10 milli-ohm MAX. after testing 15milli-ohm MAX.

A.試験法:Fig. 2のようにケーブルに力を加える。尚、試験中にDC100mAの電流を流して電気的瞬断を確認する。

B.必要条件 外観 : 部品のゆるみ、欠け、割れ、その他外観上の異常の無いこと。

電流瞬断 : 試験中、1マイクロ秒を超える電気的瞬断の無いこと。

中心導体接触抵抗 : 初期 20mΩ 以下, 試験後 25mΩ 以下

外部導体接触抵抗 : 初期 10mΩ 以下, 試験後 15mΩ 以下

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(4) Vibration / 振動

A. Testing : Apply the following vibration to the mating connector .
During the testing, run 100mA DC to check electrical discontinuity.
Frequency : 10Hz → 100Hz → 10Hz / approx 15 minutes.
Half amplitude ,Peak value of acceleration: 1.5mm or 59m/s^2 (6G)
Directions , cycle : 3 mutually perpendicular direction ,
5 cycles(approx 75min)about each direction

B.Requirements
Appearance : Looseness between the parts, chipping, breakage or other abnormality shall not occur.
Electrical discontinuity : No electrical discontinuity grater than 1micro-sec. shall occur.
Contact resistance of inner contact initial 20 milli-ohm MAX. after testing 25milli-ohm MAX.
Contact resistance of ground contact initial 10 milli-ohm MAX. after testing 15milli-ohm MAX.

A.試験法:嵌合状態のコネクタを、下記の振動を加える。尚、試験中にDC100mAの電流を流して電気的瞬断を確認する。
周波数 :10Hz→100Hz→10Hz ／ 約15分間
片振幅,加速度:1．5mm or 59m／s^2 (6G)
方向,サイクル:3つの互いに直角な方向について各5サイクル(約75分)実施

B.必要条件 外観 : 部品のゆるみ、欠け、割れ、その他外観上の異常の無いこと。
電流瞬断 : 試験中、1マイクロ秒を超える電気的瞬断の無いこと。
中心導体接触抵抗 : 初期 20mΩ 以下, 試験後 25mΩ 以下
外部導体接触抵抗 : 初期 10mΩ 以下, 試験後 15mΩ 以下

(5) Shock / 衝撃

A. Testing : Apply the following vibration to the mating connector in accordance with MIL-STD-202, Method 213, Condition B. During the testing, run 100mA DC to check electrical discontinuity.
Peak value of acceleration: 735m/s^2 (75G)
Duration : 11msec
Wave Form : half sinusoidal
Directions , cycle : 6 mutually perpendicular direction , 3 cycles about each direction

B.Requirements
Appearance : Looseness between the parts, chipping, breakage or other abnormality shall not occur.
Electrical discontinuity : No electrical discontinuity grater than 1 micro-sec. shall occur.
Contact resistance of inner contact initial 20 milli-ohm MAX. after testing 25milli-ohm MAX.
Contact resistance of ground contact initial 10 milli-ohm MAX. after testing 15milli-ohm MAX.

A.試験法:嵌合状態のコネクタを、衝撃試験機に取り付け、下記の衝撃を加える。尚、試験中にDC100mAの電流を流して電気的瞬断を確認する。MIN-STD-202 試験法 213 試験条件 B に準拠。
最大加速度:735m／s^2(75G)
標準持続時間:11msec.
波形: 半波正弦波
方向:直交する6方向、各3回

B.必要条件 外観 : 部品のゆるみ、欠け、割れ、その他外観上の異常の無いこと。
電流瞬断 : 試験中、1マイクロ秒を超える電気的瞬断の無いこと。
中心導体接触抵抗 : 初期 20mΩ 以下, 試験後 25mΩ 以下
外部導体接触抵抗 : 初期 10mΩ 以下, 試験後 15mΩ 以下

DOCUMENT CLASSIFICATION	TITLE	No.
Product Specification 製品規格	MHF series micro coaxial connector	PRS-1176

6-3-3 Environmental / 耐環境性

(1) Thermal shock/ 温度サイクル

A. Testing : Apply the following environment to the mating connector .

Temperature ,duration

:233K/30minutes→278~308K/5minutes MAX.→363K/30minutes→278~308K/5minutes MAX.

(-40℃) (5~35℃) (90℃) (5~35℃)

No. of cycles : 5 cycles

B.Requirements

Appearance : Looseness between the parts, chipping, breakage or other abnormality shall not occur.
Contact resistance of inner contact initial 20 milli-ohm MAX. after testing 25milli-ohm MAX.
Contact resistance of ground contact initial 10 milli-ohm MAX. after testing 15milli-ohm MAX.
Insulation resistance : initial 500 mega-ohm MIN. after testing 100 mega-ohm MIN.

A.試験法:嵌合状態のコネクタを、下記の雰囲気に放置する。

1サイクルの条件

:233K／30分→278～308K／5分以下→363K／30分→278～308K／5分以下

(－40℃) (5～35℃) (90℃) (5～35℃)

実施サイクル :5サイクル

B.必要条件 外観 : 部品のゆるみ、欠け、割れ、その他外観上の異常の無いこと。
中心導体接触抵抗 : 初期 20mΩ 以下, 試験後 25mΩ 以下
外部導体接触抵抗 : 初期 10mΩ 以下, 試験後 15mΩ 以下
絶縁抵抗 : 初期 500MΩ 以上 試験後 100MΩ 以上

(2) Humidity / 湿度

A. Testing : Apply the following environment to the mating connector in accordance with MIL-STD-202, Method 103, Condition B .

Temperature : 313±2 K (40±2℃)
Humidity : 90～95%RH
Duration : 96 hours

B.Requirements

Appearance : Looseness between the parts, chipping, breakage or other abnormality shall not occur.
Contact resistance of inner contact initial 20 milli-ohm MAX. after testing 25milli-ohm MAX.
Contact resistance of ground contact initial 10 milli-ohm MAX. after testing 15milli-ohm MAX.
Insulation resistance : initial 500 mega-ohm MIN. after testing 100 mega-ohm MIN.

A.試験法:嵌合状態のコネクタを、下記の雰囲気に放置する。MIL-STD-202 試験法 103 条件 B に準拠。

温度:313±2K (40±2℃)
湿度:90～95%RH
時間:96時間

B.必要条件 外観 : 部品のゆるみ、欠け、割れ、その他外観上の異常の無いこと。
中心導体接触抵抗 : 初期 20mΩ 以下, 試験後 25mΩ 以下
外部導体接触抵抗 : 初期 10mΩ 以下, 試験後 15mΩ 以下
絶縁抵抗 : 初期 500MΩ 以上 試験後 100MΩ 以上

(3) Salt water spray / 塩水噴霧

A. Testing : Apply the following environment to the mating connector in accordance with MIL-STD-202, Method 101, Condition B.

Temperature : 308±2 K (35±2℃)
Salt water density by weight : 5±1%
Duration : 48 hours

B.Requirements : Appearance no abnormality adversely affecting the performance shall occur.

DOCUMENT CLASSIFICATION	TITLE	No.
Product Specification 製品規格	MHF series micro coaxial connector	PRS-1176

A.試験法:嵌合状態のコネクタを、下記の雰囲気に放置する。
温度 :308±2K (35±2℃)
塩水濃度:5±1%(重量比)
時間 :48時間
B.必要条件 : 外観 著しい腐食の無い事。

6-3-4 Solder / 半田付け関連

(1) Solderability / 半田付け性
A. Testing : Dip the solder tine of the contact in the solder bath at 518±5(245±5℃) for 5±0.5 sec. After immersing the tine in the flux of RMA or R type for 5 to 10 seconds in accordance with MIL-STD-202, Method 208.
B.Requirements : More than 95% of the dipped surface shall be evenly wet.
A.試験法:コンタクトの半田付け部を518±5K(245±5℃)の半田槽内に5±0.5秒浸す。フラックスは、RMA又はR型を使用し5〜10秒間浸すものとする。MIL-STD-202, 試験法208に準拠。
B.必要条件:浸した面積の95%以上に半田がむらなく付着すること。

(2) Reflow soldering heat resistance / 半田耐熱性
A. Testing : Put on the receptacle connector to PCB , apply the heat 2 cycles as shown in Fig. 4

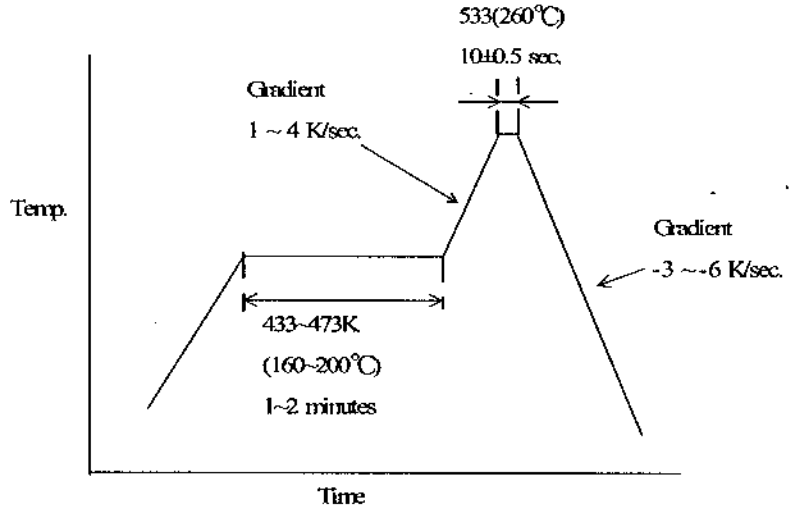


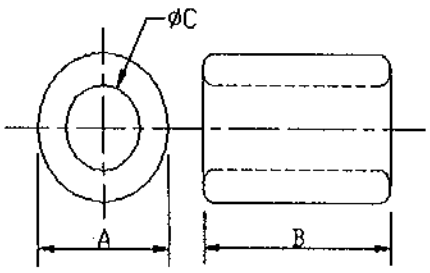
Fig.4

B.Requirements : Appearance no abnormality adversely affecting the performance shall occur.
A.試験法:基板にリセプタクルコネクタを置き、Fig. 4の条件で2回リフローを行う。
B.必要条件:機能を損なう変形及び欠陥の無い事。

SPECIFICATION

CUSTOMER:		CUST.P/N:	
ITEM:	**K5B RH 4x10x2**	K.C.P/N:	**PS0404IA**

(1) SHAPE :



A	**4±0.2**	m/m
B	**10±0.4**	m/m
C	**2±0.15**	m/m
D		m/m
E		m/m
F		m/m
G		m/m

(2)ELECTRICAL REQUIREMENTS:

Z_1= 37 $^{-0}$ OHM AT 25 MHz

Z_2= 63 $^{-0}$ OHM AT 100 MHz

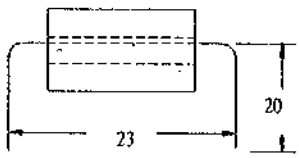
(3) TEST CONDITIONS:

1 IMPEDANCE ANALYZER: **HP4191A**

TEST FIXTURE: **HP16092A**

2.WIRE: Φ0.65 T.C.W*63m/m1/2TS

3.DRAWING:



(4)PACKING

[X] IN BULK [ ] VACUUM [ ] INSERTION

2000 PCS/BAGS* 4 BAG/INNER BOX* 4 BOXES/CARTON = 32000 PCS

PCS/PLATE* PLATES/CARTON= PCS

PCS/TRAY* TRAYS/CARTON= PCS

(5) APPEARANCE

(1)AREA OF BREAK : <2 m/m2

(2)SUM OF BREAKING AREA : <3 m/m2

(3)DEPTH OF BREAK : <1 m/m

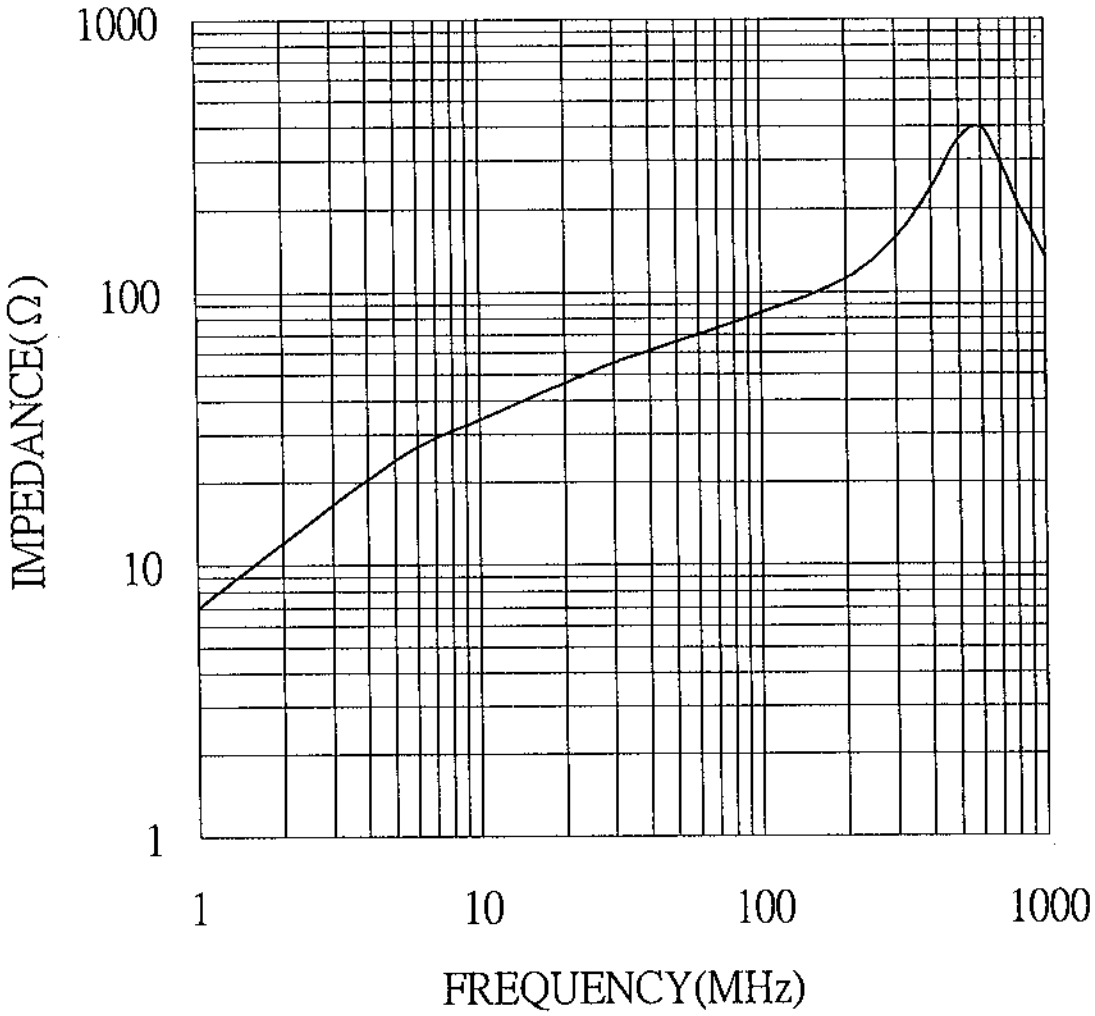
(6)REMARK:

Approved by	
Checked by	
Drawn by	
DWG.NO.	

King Core Electronics Inc.
Tel:886-3-4782511(Rep.)
Fax:886-3-4759923
E-mail : kc@mail.kingcore.com.tw

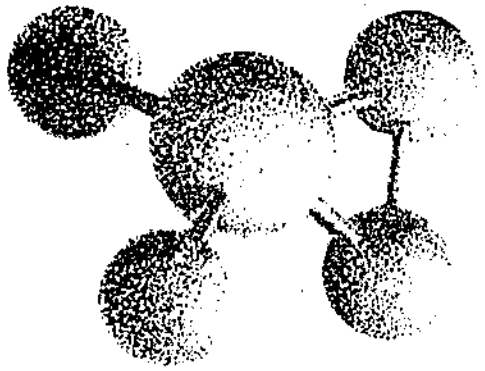
K5B RH 4x10x2

PS0404IA



King Core Electronics Inc.
Tel:886-3-4782511(Rep.)
Fax:886-3-4759923
E-mail : kc@mail.kingcore.com.tw

Two-part adhesive		1590	High Super 5	EP-330 (HighSuper30)	EP-331	1500	Super
Feature		curing for 5 min type		curing for 30 min type	curing for 30min type Low-viscosity	Standard type	
Appearance	Base	Clear, blue	Translucent, blue	Translucent, pink	Clear, light yellow	Clear, light yellow	Translucent
	Hardener	Clear ight yellow	Translucent, light yellow	Translucent, milk white	Clear, light yellow	Clear, light brown	Light yellow
Viscosity (Pa・S/20°C)	Base	8	120	80	7	25	100
	Hardener	12	70	170	7	60	50
Specific gravity (g/cm³)	Base	1.17	1.17	1.17	1.16	1.16	1.14
	Hardener	1.11	1.15	1.14	1.16	0.97	0.99
Mixing ratio(Base:Hardener)		1 : 1	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1
Pot life		Within 5 min	Within 5 min	Within 30 min	Within 30 min	Within 1 hr	Within 1 hr
Tensile shear strength(N/mm²)		19.0	18.0	17.5	17.6	15.7	15.1
T-Formed peeling adhesion (N/mm)		2.71	0.31	0.47		0.40	
Hardness (shore D)		77	77	82	71	82	
Coefficient of linear expansion ($\times 10^{-5}$)		8.6	10.7	6.7	4.1	7.1	
Tg (°C)			47	43		53.7	
Volume resistivity (Ω・cm)			4.9×10^{15}	3.8×10^{11}	3.6×10^{11}	1.1×10^{16}	
Coefficient of water absorption (%)			2.5	2.3		0.8	
Capacity standards		Base 1 kg Hardener 1 kg	6 g set 15 g set 25 g set 80 g set	320 ml set Base 3 kg Hardener 3 kg 6 g set, 15 g set, 80 g set	Base 1 kg Hardener 1 kg	Base 500 g, 1 kg, 3 kg, 15 kg Hardener 500 g, 1 kg, 3 kg, 15 kg	15 g set 40 g set 110 g set



施敏打硬 CEMEDINE 1500

〔一般性質〕

	主　　劑	硬 化 劑
主要成分	環氧（Epoxy）樹脂	聚醯胺（Poly-Amido）樹脂
顏色常態	的中間體淺黃色透明液體	琥珀色透明液體
不揮發率（%）	99.6	99.4
黏度(9/20°C)	350	600
比重(20/20°C)	1.16	0.97
溶　　劑	無	
硬化劑混合比例phr	60～110	
保持黏度時間	參照混合硬化劑後的黏度變化表	
膠化時間	3小時	
硬化所需時間	6小時10分鐘	
可保存時間(20°C)	2年	

〔特性〕

由兩種液體混合而成的環氧（Epoxy）樹脂系黏著劑，能在常溫下硬化，應用範圍至爲廣汎，可確定黏着金屬，塑膠以及其他各種物質。而由於此黏着劑，通常以聚醯胺）Poly-Amido）樹脂爲其硬化劑，具有下列各優點：

1. 能在常溫下硬化。
2. 縱使所使用的硬化劑份量不同，也不影響其特性。
3. 由於能產生比一般黏着劑富有彈曲性的黏着層，縱使黏着不同材質的物品，也能以黏着層緩和熱膨脹的差別所引起的兩物品彎曲，對機械學的衝擊也能顯示較爲良好的性能。
4. 由於能形成透明的黏着層，可以黏着透明的物質，如玻璃等等。

〔用　途〕

由於能强力黏着各種物質，諸如金屬，熱硬化塑膠，玻璃，飛機裝配以及一般家庭器具等等，應用範圍至爲廣汎。

縱然是聚乙烯（Polythylene），聚酯（Polyester），天然以及人造橡膠等，以一般的黏着根本無法黏着的物質，如果加以適當的表面處理，卽可强力黏着。

〔實　例〕

汽車、火車、船隻、飛機……。（將金屬把手黏着於玻璃窗／可以黏着超製品，三聚黑胺（Melamine）裝飾板等，於內部以增加强度／不同金屬間爲兼防止電傷且加黏之／當作防腐塗料亦可）。

電器製品……。（由於是一種優秀的黏着劑，使用於高級擴聲器、音響線圈的黏着／電磁器或外殼的黏着／線圈框的黏着／鐵粉蕊的黏着／馬達線圈的黏着等等）。

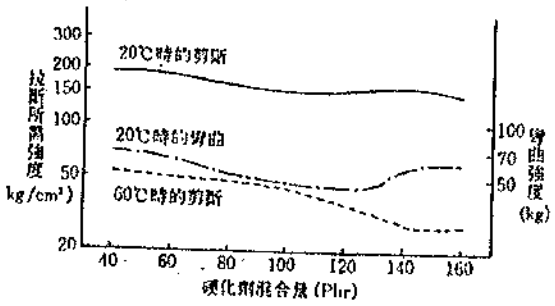
建築……（玻璃、壓克力門或將文字板黏於屋瓦黏住把手／照明設備以及其他塑膠裝飾品的加黏以及組立／不銹鋼製品、鋁製建材、陶器或大理石等需要强力黏劑物品的加黏）。

高級裝飾品，玻璃以及塑膠製工藝品，精密機械……（照像機，調整距離儀／分光儀等等的固定）。

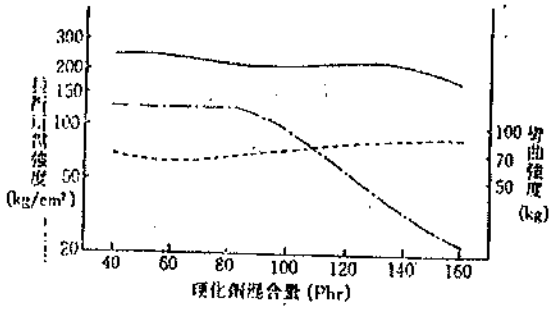
其他諸如鏡頭，運動器材，公路標誌等等的加黏。

除上述各種加黏外，也可以使用作填充劑，鑄模用，敷層用以及國裏用。

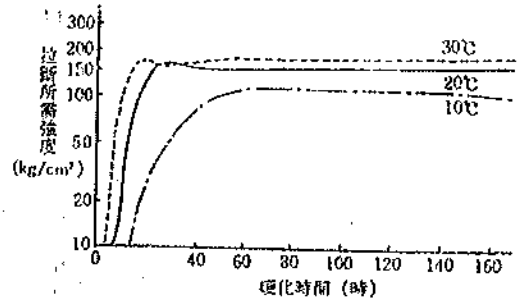
加熱溫度	加熱時間
60 ℃	120分以上
80 ℃	60～90分
100 ℃	40～60分
120 ℃	30～40分



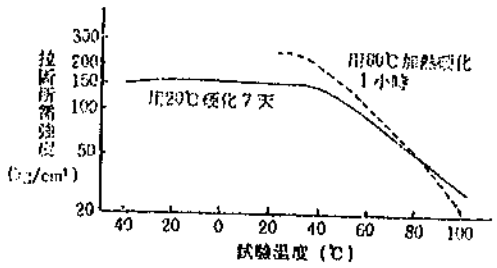
圖Ⅱ 2.1
硬化劑混合量和黏力強度
（在20°C七天的硬化）
試驗片：軟鋼板 (25×100×1.6mm)
(Over-lap)12.5mm



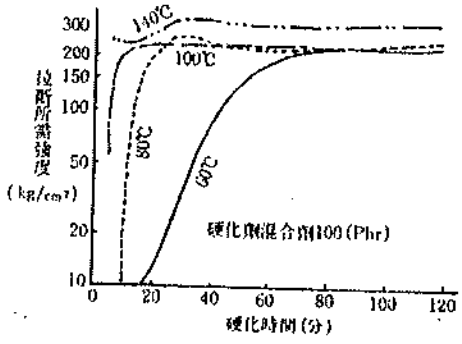
圖Ⅱ 2.2
硬化劑混合量和黏力強度
（在80°C一小時的硬化）
試驗片：以及其他同圖Ⅱ 2.1



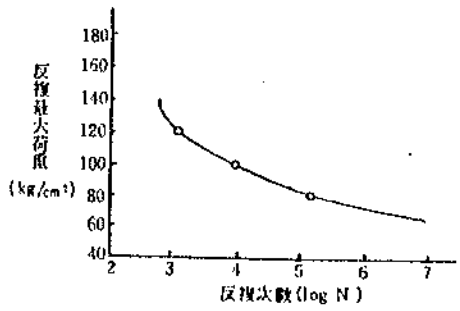
圖Ⅱ 2.3
常溫時的硬化特性 硬化劑混合率 100phr



圖Ⅱ 2.5
耐熱特性 硬化劑混合率爲 100phr



圖Ⅱ 2.4
加熱硬化特性 硬化劑混合率爲 100phr



圖Ⅱ 2.6
老化特性

表Ⅱ 2.1 物理特性

抗 張 力 (kg/mm²)	5.04	硬度 ロックウェルM	68
抗 折 力 (kg/mm²)	7.40	硬度 バーコル	67
彎曲彈性率 (kg/mm²)	214	硬度 ショアーD	82
衝擊强度 (kg/mm²)	11.6	表面固定電阻 (Ω)	5.6×10^{13}
壓縮强度 (kg/mm²)	15.10(6.41)(*)	體積固有電阻 (Ω-Cm)	10.5×10^{15}
熱變形溫度 (°C)	47	誘電率 (10^6cycle)	2.94
		電探破壞 (kv/mm)	19

表Ⅱ 2.2 拉斷所需强度

被粘體	拉斷所需强度	被粘體	拉斷所需强度 (20°C)
柳桉材	83	多元焦炭	22
馬來西亞杉材	106 ※	苯乙烯樹脂	19
針葉樹材	99< ※	壓克力樹脂	30
杉材	66	聚氯乙烯樹脂	36
鐵	158	三聚氰胺裝飾板(表面)	55
鋁	61	三聚氰胺裝飾板(背面)	45
黃銅	60		
銅	80	F R P	125
鍍鋅電鐵	71		
洋鐵	50		

〔註〕 1. 粘着條件： 20°C，硬化7天，硬化劑混合比 100phr(接合部over-lap)12.5mm。

2.※記號者表示材料拉斷。

表Ⅱ 2.3 促進劣化特性

試驗	未試驗前的粘力强度 (kg/cm²)	比較調整試驗片的粘力强度(1)（1個月） (kg/cm²)	經過各試驗1個月後的粘力强度 (kg/cm²)	經過各試驗1,000小時後的粘力强度 (kg/cm²)
利用測候儀所做的耐候試驗	143	150	—	166
利用噴射鹽水的促進試驗	143	150	100	—
利用高溫高濕的促進試驗(2)	143	150	143	—
利用反復冷却的促進試驗(3)	143	150	183	—

〔註〕 (1) 20±1°C, 65±5%RH 各保持1個月的試驗片；(2)50°C100%RH；(3)—5°C8小時～50°C16小時。

表Ⅱ 2.4 耐候性

拉斷所需强度 (kg/cm²)

暴露前的粘力强度					147
比較調整試驗片的粘力强度（6個月）	※	156	在戶外暴露6個月的粘力强度		147
〃 （1年）	※	138	〃 1年	〃	152
〃 （2年）	※	130	〃 2年	〃	138
〃 （3年）	※	123	〃 3年	〃	137
〃 （10年）	※	111	〃 10年	〃	130

〔註〕※20±1°C, 65±5%RH 保持各期間的試驗片。

表Ⅱ 2.5 耐水性 (20°C, 7天硬化)

拉斷所需强度 (kg/cm²)

試驗＼時間	0	3個月	6個月	1年
常態試驗	120	106	123	120
耐水試驗		109	117	109

〔註〕硬化劑混合比爲 100phr
試驗片：不銹鋼 (100×25×1.5mm)
(接合部Over-lap)12.5mm。

表Ⅱ 2.6 耐水性 (60°C, 2小時硬化)

拉斷所需强度 (kg/cm²)

試驗＼時間	0	3個月	6個月	1年
常態試驗	157	150	169	163
耐水試驗		133	108	116

〔註〕同表Ⅱ 2.5

表II 2.7 耐 油 性　　拉斷所需強度 (kg/cm²)

放置日數	1天	3天	5天	10天	20天	1個月
放置於20°C室溫	—	—	—	80.0	—	79.0
0°C油中	—	—	77.5	87.5	—	80.0
20°C油中	—	—	82.5	77.6	—	89.5
70°C油中	77.6	75.3	80.0	74.3	—	71.0
循環油中 cycle	—	—	79.0	78.0	89.0	76.0

放置日數	40天	2個月	3個月	6個月	1年	10年
放置於 20°C室溫	—	—	73.0	65.9	76.3	75.9
0°C油中	—	86.5	71.5	80.5	80.2	—
20°C油中	—	70.5	79.5	78.7	79.7	—
70°C油中	—	75.5	—	75.4	68.3	—
循環油中 (cycle)	71.5	—	—	—	—	—

〔註〕1. 硬化劑混合比爲80phr，試驗片電木片 (100×25×3mm)接合部(Over-lap)12.5mm　2. 油爲變壓器油。
3. 試驗片全部破裂。

表II 2.8 耐溶劑、耐藥品性

種類		浸漬7天後的黏力保持率 (%)		浸漬1個月後的黏力保持率 (%)	
		以20°C硬化7天的試驗片	以80°C硬化1小時的試驗片	以20°C硬化7天的試驗片	以80°C硬化1小時的試驗片
溶劑	已烷	107.0	80.6	91.1	78.8
		85.5	63.8	51.7	66.8
		88.8	69.5	93.4	70.8
		89.5	71.3	97.4	68.7
		90.2	64.7	101.3	69.1
	三氯化烯	91.5	72.7	65.0	69.5
油	植物油	102.7	90.8	107.3	90.3
	礦物油	96.2	87.8	98.1	84.2
藥品	蒸餾水	93.4	72.3	96.3	69.3
	10% 硝酸溶液	93.4	72.8	79.8	69.8
	10% 硫酸溶液	74.7	67.8	70.8	57.2
	10% 苛性蘇打溶液	97.2	74.3	83.8	74.3
	10% 食鹽水溶液	89.6	71.8	91.0	69.8
	10% 醋酸溶液	91.2	77.8	78.4	61.2

〔註〕黏劑混合率＝1：1，試驗片：軟鋼片 (25×100×1.6mm) 但是耐藥試驗時使用了SUS-27，接合部 (Over-lap) 爲 12.5mm。

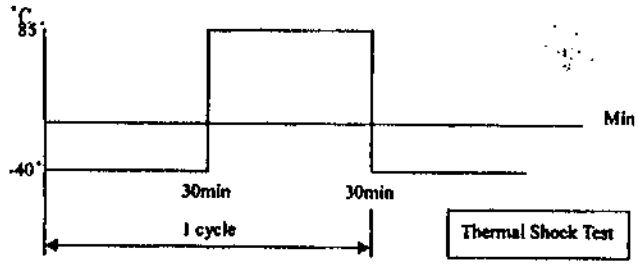
容量規格—(主)、(硬) 110g、1kg、　　15kg (組)

台灣 施敏打硬 セメダイン 股份有限公司
總 公 司：台北縣淡水鎮下圭柔山76-3號
電　　話：(02) 2629-1425・2629-1443
F A X：(02) 8631-6806
高雄分公司：高雄市三民區熱河二街14號
電　　話：(07) 3118198・3215666

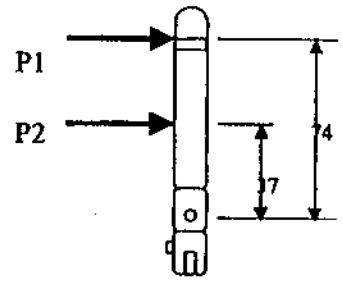
Antenna Bending Force Test

Part Name : RF Antenna able Assembly
Customer P/N :

1. Test Equipment : Thermal Shock Tester + Pull tester
2. Test condition : -40°C to +85°C each 30min one cycles test 100cycles.
3. Specification : The bending force must be above 20g in 74mm distance after 1000 cycles bending test.



Thermal Shock Test



Bending Test Structure

Test Item	Bending force				Lock pin Status
	Before 1000 cycles bending		After 1000 cycles bending		
	P1	P2	P1	P2	
Sample 1	95 g	181 g	38 g	75 g	No drop
Sample 2	100 g	187 g	43 g	88 g	No drop
Sample 3	101 g	204 g	41 g	82 g	No drop
Sample 4	94 g	188 g	40 g	84 g	No drop
Sample 5	109 g	202 g	45 g	93 g	No drop
Specification > 20g at 74mm	Pass	Pass	Pass	Pass	Pass

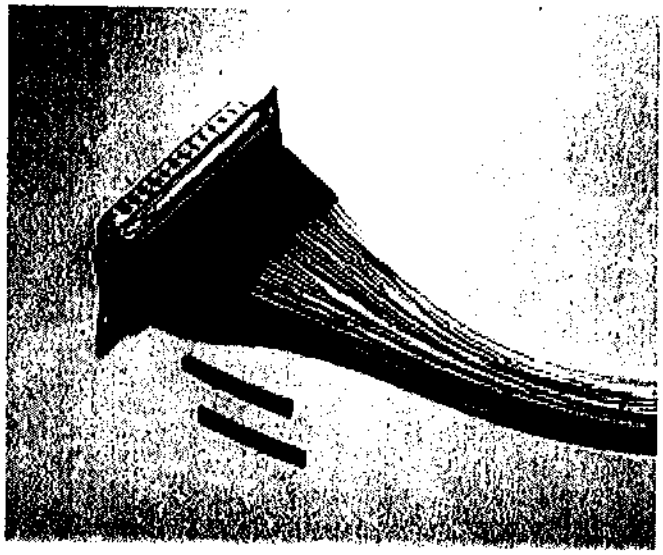
Fax-on-Demand: (800) 260-9099
(650) 361-6523

Before ordering check with factory for most current data.

FAX ID	Description
2240	Data sheet
2590	RW-3010

Versafit V4

Very-thin-wall, very flexible, highly flame-retardant polyolefin tubing



Applications

Typically used where space saving is important. Offers the ability to pack components more closely than is possible with standard tubings. Cost-effective choice for many commercial applications; electrically insulates and protects in-line components, disconnect terminals, and splices. Used for strain relief on high-density connectors.

Operating Temperature Range

–55°C to 125°C

Features/Benefits

- 2:1 shrink ratio.
- Very thin wall provides space savings and rapid shrinking.
- Low shrink temperature further reduces installation time and risk of damage to temperature-sensitive components.
- Very flexible; doesn't easily wrinkle when bent.
- Free of polybrominated biphenyls (PBBs) and polybrominated biphenyl oxides and ethers (PBBOs and PBBEs), which are classified as environmentally hazardous substances.

Installation

Minimum shrink temperature: 70°C
Minimum full recovery temperature: 90°C

Specifications/Approvals

Series	UL	CSA	Raychem
Versafit V4	E35586 VW-1 300 V, 125°C	LR31929 OFT 150 V, 125°C	RW-3010

Product Dimensions

	As supplied		After shrinkage	
Metric sizes	Inside Diameter	Wall thickness (nominal)	Inside diameter (max.)	Wall thickness* (min.)
1.0/0.5	1.4 ±0.25	0.1	0.5	0.25
1.5/0.75	1.9 ±0.25	0.1	0.75	0.25
2.0/1.0	2.3 ±0.25	0.1	1.0	0.25
2.5/1.25	2.8 ±0.25	0.15	1.25	0.25
3.0/1.5	3.3 ±0.25	0.15	1.5	0.25
3.5/1.75	3.8 ±0.25	0.15	1.75	0.25
4.0/2.0	4.4 ±0.25	0.15	2.0	0.25
Inch sizes (mm/*in*)				
3/64	1.2 *(.046)*	0.6 *(.023)*	.30 ±.05 *(.012 ±.002)*	
1/16	1.6 *(.063)*	0.8 *(.031)*	.30 ±.05 *(.012 ±.002)*	
3/32	2.4 *(.093)*	1.2 *(.046)*	.30 ±.05 *(.012 ±.002)*	
1/8	3.2 *(.125)*	1.6 *(.062)*	.33 ±.05 *(.013 ±.002)*	
3/16	4.8 *(.187)*	2.4 *(.093)*	.33 ±.05 *(.013 ±.002)*	

*Wall thickness will be less if tubing recovery is restricted during shrinkage.

	As supplied		After shrinkage	
Size	Inside diameter	Wall thickness	Inside diameter (max.)	Wall thickness* (min.)
5.0/2.5	5.5 ±0.25	0.15	2.5	0.25
6.0/3.0	6.5 ±0.4	0.15	3.0	0.28
7.0/3.5	7.5 ±0.4	0.15	3.5	0.28
8.0/4.0	8.5 ±0.4	0.15	4.0	0.28
9.0/4.5	9.5 ±0.4	0.15	4.5	0.28
10.0/5.0	10.5 ±0.5	0.15	5.0	0.28
1/4	6.4 *(.250)*	3.2 *(.125)*	.36 ±.05	*(.014 ±.002)*
3/8	9.5 *(.375)*	4.8 *(.187)*	.36 ±.05	*(.014 ±.002)*
1/2	12.7 *(.500)*	6.4 *(.250)*	.36 ±.05	*(.014 ±.002)*
3/4	19.1 *(.750)*	9.5 *(.375)*	.46 ±.08	*(.017 ±.003)*
1	25.4 *(1.000)*	12.7 *(.500)*	.51 ±.08	*(.020 ±.003)*

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	Other colors available upon request.
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Marking	Marked with UL/CSA/-F- legends.	
Ordering description	Specify product name, size, and color (for example, Versafit V4-1.0-0).	

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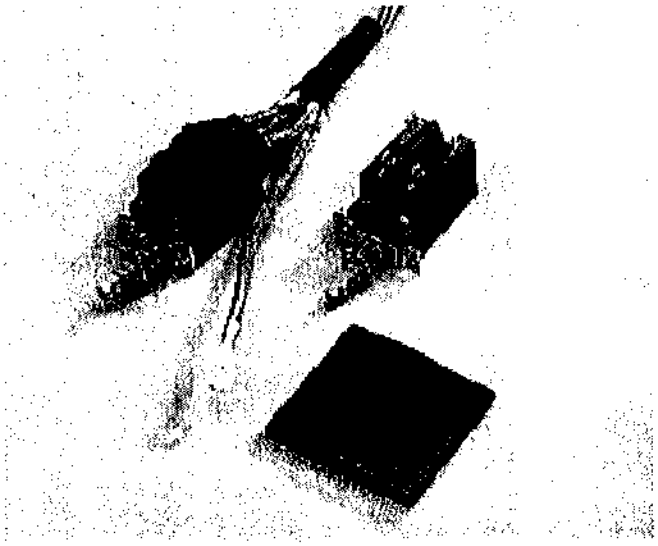
factory for most current data.



Applications
Cost-effective choice for many commercial and military applications; electrically insulates and protects in-line components, disconnect terminals, and splices. Bundles wires for very flexible light-duty harnesses. Strain-relieves electrical wire connections for commercial applications. Identifies or color-codes wires, cables, terminals, and components.

Operating Temperature Range
–55°C to 125°C

Features/Benefits
- 2:1 shrink ratio.
- Low shrink temperature reduces installation time and the risk of damage to temperature-sensitive components.
- Very flexible; doesn't easily wrinkle when bent.
- Hot stamps extremely well.
- Free of polybrominated biphenyls (PBBs) and polybrominated biphenyl oxides and ethers (PBBOs and PBBEs), which are classified as environmentally hazardous substances.
- Higher temperature rating, better thermal stability, and higher resistance to physical abuse than noncrosslinked materials.

Installation
Minimum shrink temperature: 70°C
Minimum full recovery temperature: 90°C

Specifications/Approvals

Series	UL	CSA	Raychem
Versafit	E35586 VW-1 600 V, 125°C	LR31929 OFT 600 V, 125°C	RW-3023

Product Dimensions (mm)

	As supplied		After shrinkage	
Size	Inside diameter	Wall thickness (nominal)	Inside diameter (max.)	Wall thickness* (min.)
1.0	1.6 ±0.2	0.2	0.5	0.33
1.5	2.1 ±0.2	0.2	0.75	0.35
2.0	2.6 ±0.2	0.25	1.0	0.43
2.5	3.1 ±0.2	0.25	1.25	0.43
3.0	3.6 ±0.2	0.25	1.5	0.43
3.5	4.1 ±0.3	0.25	1.75	0.43
4.0	4.6 ±0.3	0.25	2.0	0.43
5.0	5.6 ±0.3	0.3	2.5	0.56
6.0	6.6 ±0.3	0.3	3.0	0.56
7.0	7.6 ±0.3	0.3	3.5	0.56
8.0	8.6 ±0.3	0.3	4.0	0.56
9.0	9.6 ±0.3	0.3	4.5	0.56
10.0	10.4 ±0.3	0.3	5.0	0.56

	As supplied		After shrinkage	
Size	Inside diameter	Wall thickness (nominal)	Inside diameter (max.)	Wall thickness* (min.)
11.0	11.4 ±0.3	0.3	5.5	0.56
12.0	12.7 ±0.3	0.3	6.0	0.56
13.0	13.5 ±0.3	0.35	6.5	0.66
14.0	14.4 ±0.4	0.35	7.0	0.68
15.0	15.7 ±0.4	0.35	7.5	0.68
16.0	16.9 ±0.4	0.35	8.0	0.68
18.0	19.0 ±0.4	0.4	9.0	0.76
20.0	21.4 ±0.4	0.4	10.0	0.76
22.0	23.2 ±0.4	0.45	11.0	0.89
25.0	26.8 ±0.4	0.45	12.5	0.89
27.0	28.2 ±0.5	0.45	12.5	0.89
28.0	30.0 ±0.5	0.45	14.0	0.89
30.0	32.1 ±0.5	0.45	15.0	0.89

*Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0), white (-9), red (-2), blue (-6), yellow (-4), green (-5)
	Nonstandard	Orange (-3), violet (-7), brown (-1), gray (-8)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Marking	Marked with UL/CSA/-F- legends.	
Ordering description	Specify product name, size, and color (for example, Versafit V2-3.0-0).	