

# 承 認 書

SPECIFICATION FOR APPROVAL

客戶名稱： 百 一 電 子 股 份 有 限 公 司

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客戶料號：

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品 名： MINI COAXIAL CABLE A'SSY , L=10cm

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承認日期： 2004 / 04 / 27

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客戶簽回：

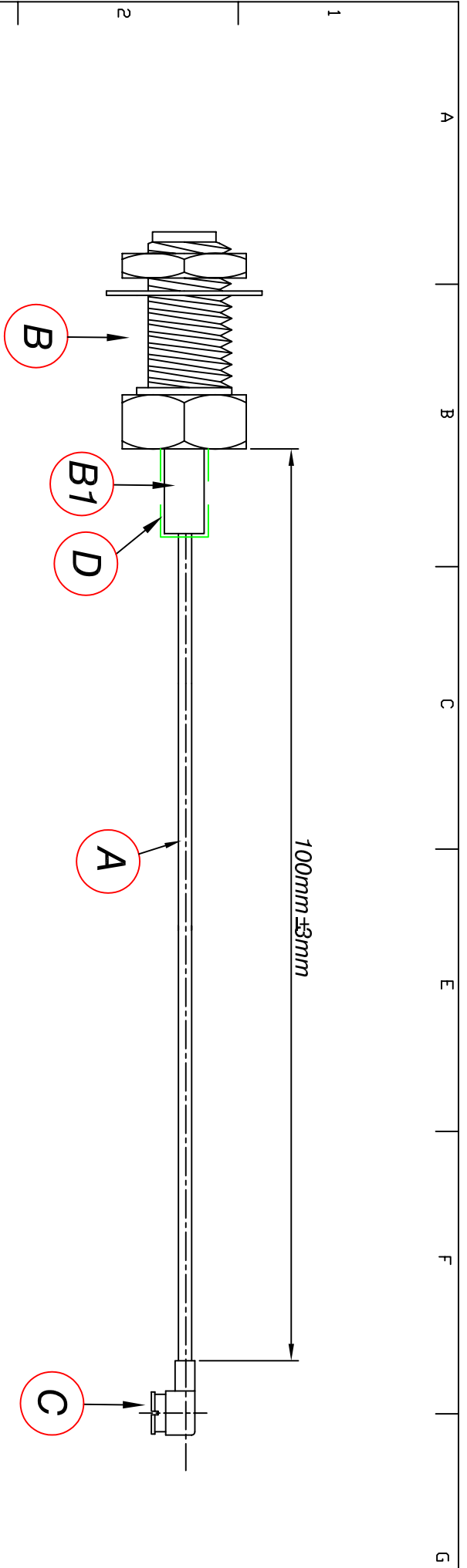
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申 群 有 限 公 司

SHEN CHYUN CO., LTD.

桃園市永星街 73 巷 18 弄 17 號  
電話:(03)3411338  
傳真:(03)3411299  
統一編號:23835622

1FL.,NO.17,ALLEY 18,LANE 73,  
YUNG HSING ST.,TAOYUAN CITY,  
TAIWAN,R.O.C.  
TEL:886-3-3411338  
FAX:886-3-3411299



Note : Conn. B 平面必須與Conn. C 同方向!

品名規格	材料編號	數量
A Mini Coaxial Cable OD=1.32mm,L=110mm	8132-0110-0703 (KUFABE or Equivalent)	1EA
B RSMA S/T JACK, 螺牙長度=9mm	R SMA805-132A1 ( ShenChyun or Equivalent )	1EA
B1 銅管, L=8mm	R SMA805-132A2 ( ShenChyun or Equivalent )	1EA
C Mini RF Connector For OD=1.32mm ( TYPE I )	1566412-1 ( TYCO or Equivalent )	1EA
D Tube 3φ, L=10mm	F5003-010 ( LongWell or Equivalent )	1PC

MATERIAL:	FINISH:
-----------	---------

TOLERANCES UNLESS OTHERWISE SPECIFIED.				UNIT =
DECIM	INCH	MM	ANGULAR	SCALE = FREE
1.PLACE ±		±	±	DO NOT SCALE DRAWING.
2.PLACE ±		±	±	
3.PLACE ±		±	±	

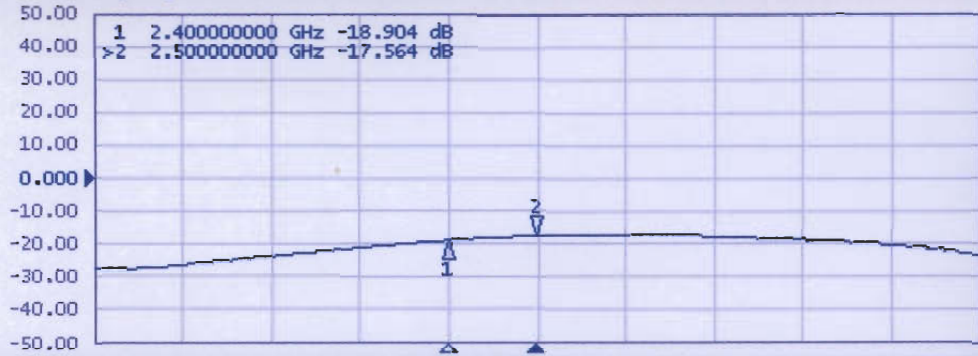
TITLE: Mini RF Cable Assy

SHEN CHYUN LTD

APPROVED for production by:	REVISION
O	

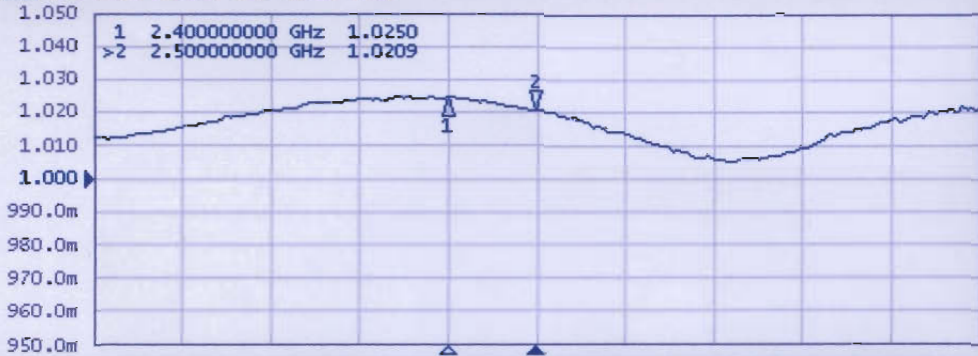
DESIGNER:	DWG NO.	REV
DWG BY:	7132-0100-0001	A01
CHECKED BY:	SHEET 1	DF 1

Tr1 S11 Log Mag 10.00dB/ Ref 0.000dB



1 Start 2 GHz IFBW 300 Hz Stop 3 GHz Off

Tr1 S11 SWR 10.00m/ Ref 1.000 [F1]



2 Start 2 GHz IFBW 300 Hz Stop 3 GHz C? #

System

Print

Abort Printing

Printer Setup

Invert Image  
ON

Dump  
Screen Image

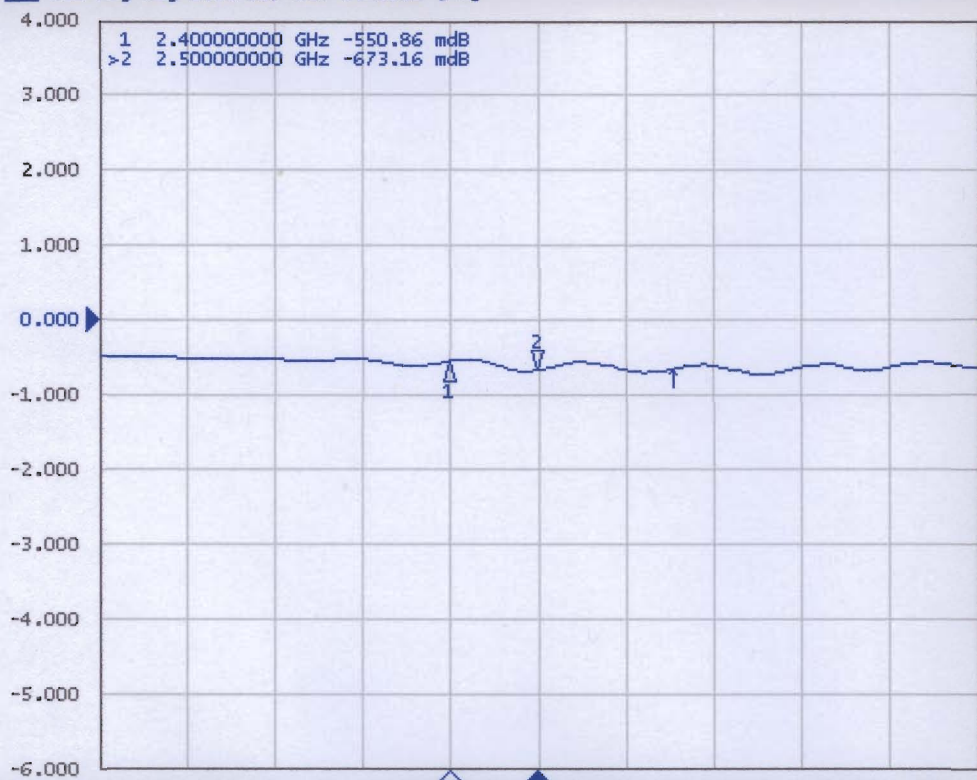
E5091A Setup

Misc Setup

Backlight  
ON

Firmware  
Revision

▶ S21 Log Mag 1.000dB/ Ref 0.000dB [RT]



1 Start 2 GHz

IFBW 100 Hz

Stop 3 GHz

C?

System

Print

Abort Printing

Printer Setup

Invert Image

ON

Dump  
Screen Image

E5091A Setup

Misc Setup

Backlight

ON

Firmware  
Revision

**KURABE INDUSTRIAL CO., LTD**

DRAFT	<b>FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE (FWS 5005)</b>	PAGE	1/4
PRODUCT STANDARD		ISSUED	21-11-2001
		REVISED	

**1. SCOPE**

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

These cable are approved by UL as Style 1979 AWM (File E-46702)

[UL1979:105°C、30V]

Use: Internal wiring of Class 2 Circuits of Electronic Equipment.

**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.

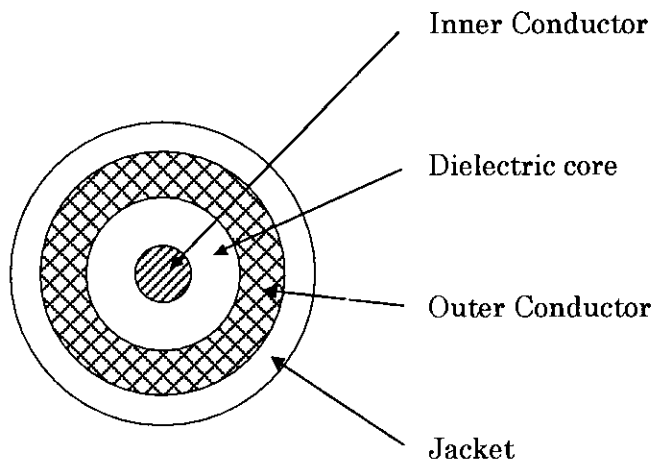


Figure 1.

NOTE :	MADE BY	<i>J. Seki</i>
	APPROVALS	<i>N. Ikegaya</i>

**KURABE INDUSTRIAL CO., LTD**

DRAFT	<b>FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE (FWS 5005)</b>	PAGE	2/4
PRODUCT STANDARD		ISSUED	21-11-2001
		REVISED	

Table 1. Construction

Item	Unit	Specified Value
Inner Conductor	Material	—
	Stranding	No./mm
	Dia.(approx.)	mm
Dielectric Core	Material	—
	Thick.(nom.)	mm
	Dia.	mm
	Color	—
Outer Conductor	Material	—
	Type	—
	Dia.(approx)	mm
Jacket	Material	—
	Thick.(nom.)	mm
	Dia.	mm
	Color	—

Table 2. Performance

Item	Unit	Specified Value	Note
Appearance	—	Faultless in visible	—
Inner conductor resistance	$\Omega$ /km	Max.597	At 20°C
Insulation resistance	$M\Omega \cdot km$	Min.1000	At 20°C
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. 95	At 1kHz
Characteristic impedance	$\Omega$	$50 \pm 2$	TDR method
Attenuation (nom.)	dB/m	2.0	1.0GHz
		2.6	1.5GHz
		3.0	2.0GHz

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

NOTE :	MADE BY	<i>F. Seki</i>
	APPROVALS	<i>N. Ikegaya</i>

KURABE INDUSTRIAL CO., LTD

DRAFT	<b>FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE (FWS 5005)</b>	PAGE	3/4
PRODUCT STANDARD		ISSUED	21-11-2001
		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 °C

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 (Style No. designation),,
- (2) Maximum working voltage,
- (3) Maximum working temperature,
- (4) Conductor size,
- (5) Nominal insulation thickness,
- (6) Length,
- (7) Date of manufacture or LOT No.,
- (8) Manufacture's name,
- (9) Specification No.,and
- (10) Use of cable, and

9. PACKAGE

The finished cables are cut into a shipping length of 200 meters, coiled and packed securely to prevent injuries during transportation.

Odd length of the finished cables which are not shorten than 50 meters may be accepted for shipping.

NOTE :	MADE BY	<i>J. Seki</i>
	APPROVALS	<i>N. Okegaya</i>

KURABE INDUSTRIAL CO., LTD

DRAFT	<b>FEP INSULATED HIGH-FREQUENCY COAXIAL CABLE (FWS 5005)</b>	PAGE	4/4
PRODUCT STANDARD		ISSUED	21-11-2001
		REVISED	

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.

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

① Do 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.

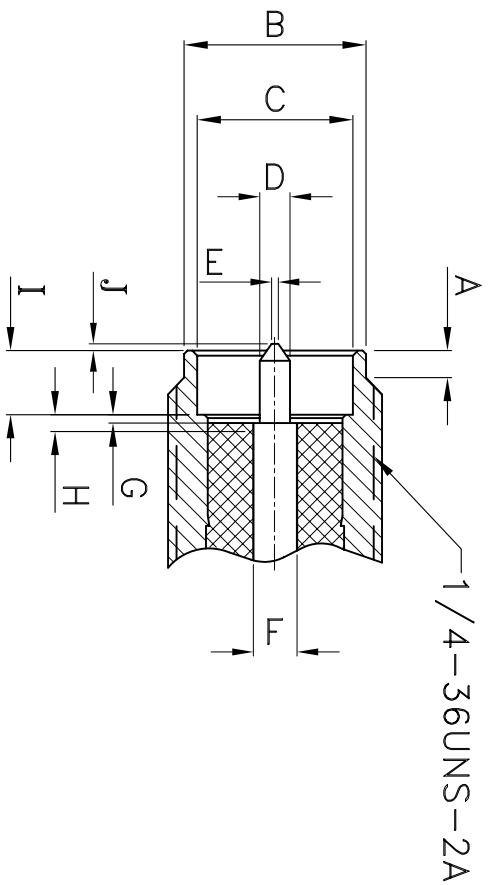
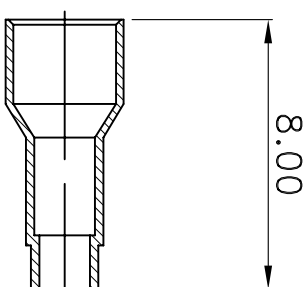
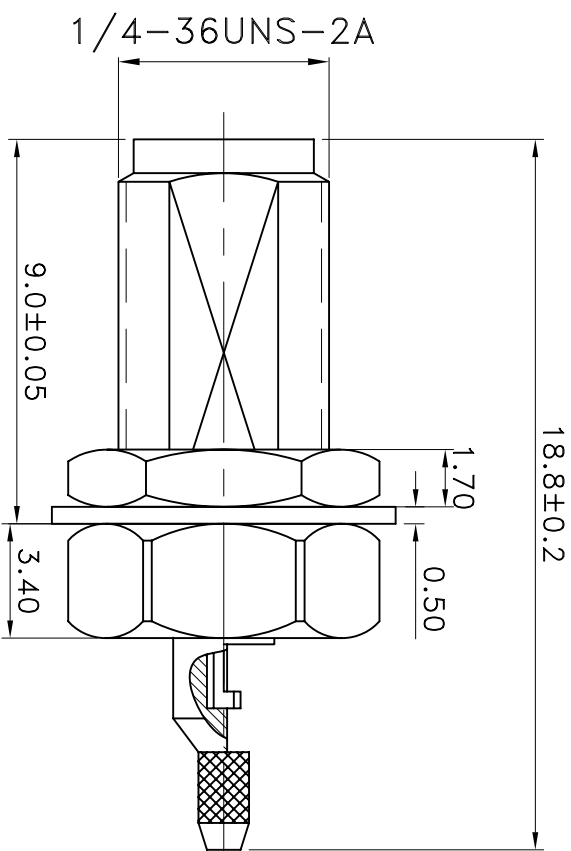
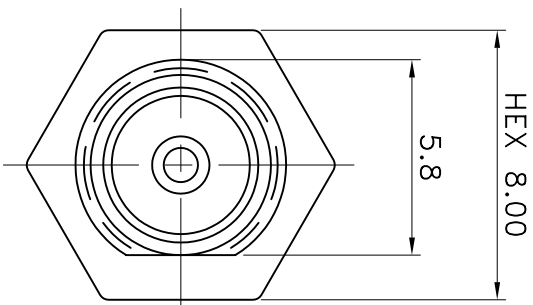
② Avoid unnecessary excessive force to cable, such as pulling, twisting, bending or tightening.

10-5. Storage precautions

Avoid continuous exposure to sunlight.

NOTE :	MADE BY	<i>J. Seki</i>
	APPROVALS	<i>n Ikegaya</i>





Letter	JACK	
	Minimum	Maximum
A	0.38	1.14
B	5.28	5.49
C	4.60	4.67
D	0.90	0.94
E	0.00	0.38
F	1.24	1.30
G	0.00	0.25
H	0.00	0.25
I	1.88	1.98
J	0.00	0.30

REFERENCE PLANE

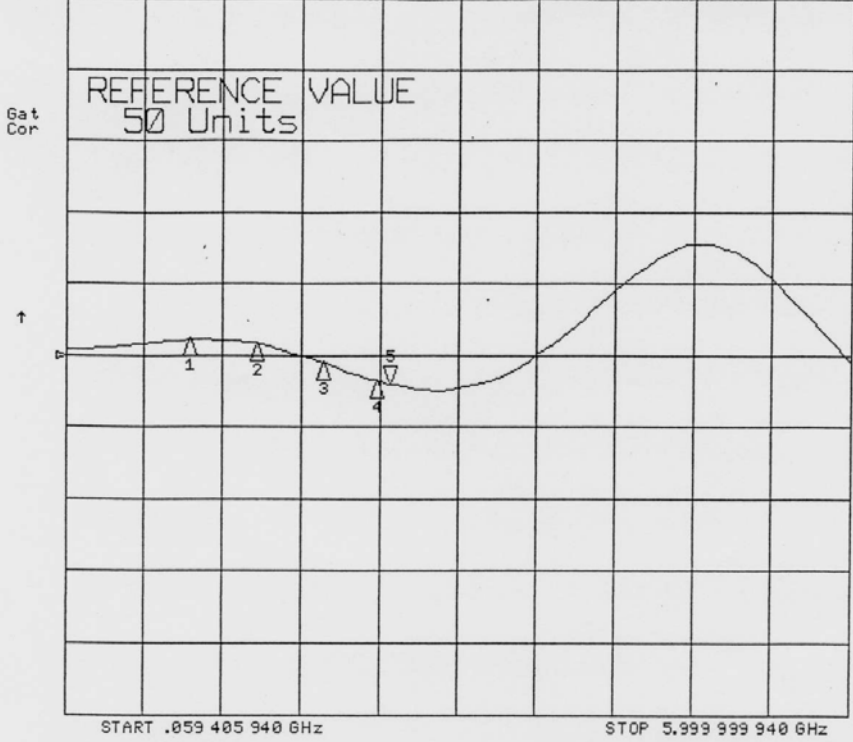
1	圖號	原材料規格	銅	鍍鎳層	1
序號	圖號	原材料規格	材質	鍍層	用量
產品名稱 ITEM	RSMA S/T JACK CRIMP TYPE, L=9mm			一般公差	
產品編號 ITEM NO	RSMA805-132A			X.	±0.3
圖號 CHARTNO	RSM AJ-7-3			X	±0.2
備注 REMARK				XX	±0.1
視圖	比例	4:1	單位	MM	

申群有限公司		制圖	A	日期	2004.3.4
SHEN CHYUN LTD		審核		日期	

ZONE	REV	DESCRIPTION	DATE	APPROVED
REVISIONS				

14 May 2004 16:46:01

CH1 Z:R LIN 10 U/REF 50 U 5: 46.068 U 2.500 000 000 GHz



CH1 Markers

1: 52.221 U  
1.00000 GHz

2: 51.654 U  
1.50000 GHz

3: 49.046 U  
2.00000 GHz

4: 46.480 U  
2.40000 GHz

CH1 S22 1 U FS

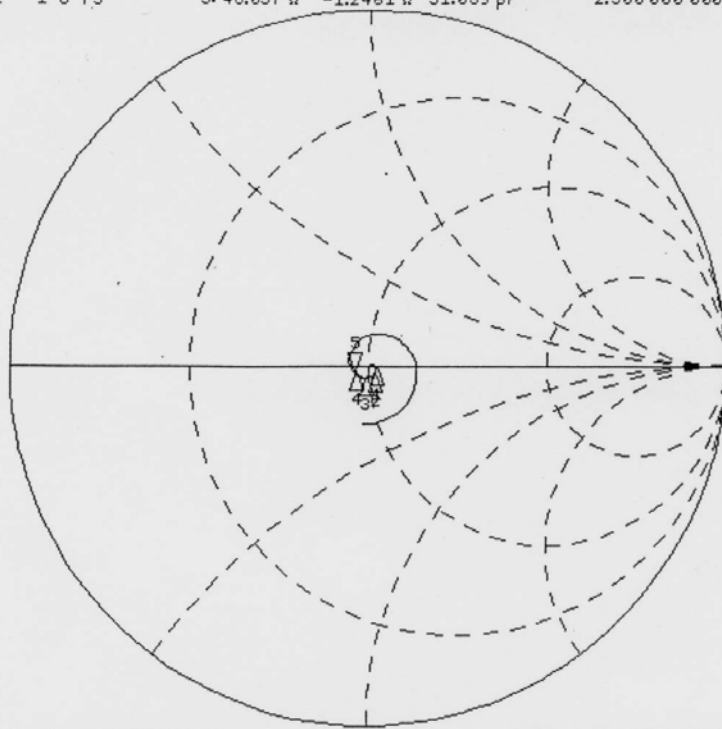
5: 46.057  $\Omega$  -1.2461  $\Omega$  51.089 pF

14 May 2004 16:48:43

2.500000000 GHz

Gat  
Cor

↑



CH1 Markers

1: 52.207  $\Omega$   
-595.70 m $\Omega$   
1.00000 GHz

2: 51.596  $\Omega$   
-2.4785  $\Omega$   
1.50000 GHz

3: 48.955  $\Omega$   
-3.2402  $\Omega$   
2.00000 GHz

4: 46.451  $\Omega$   
-1.8770  $\Omega$   
2.40000 GHz

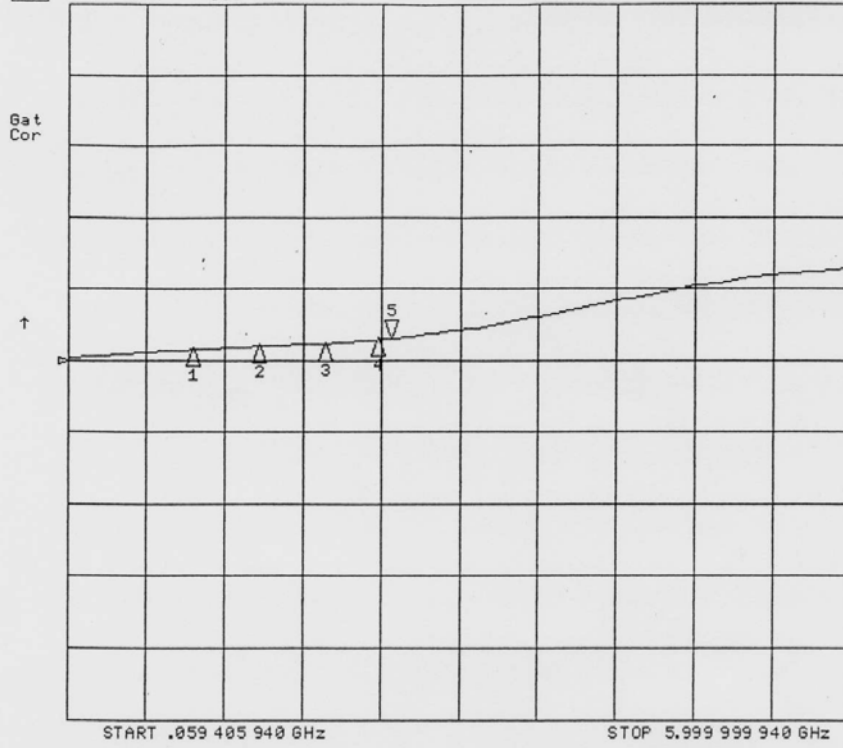
START .059405940 GHz

STOP 5.99999940 GHz

14 May 2004 16:49:34

CHI S22 SWR 300 m / REF 1

5: 1.0900 2.500 000 000 GHz



CH1 Markers

1: 1.0458  
1.00000 GHz

2: 1.0599  
1.50000 GHz

3: 1.0713  
2.00000 GHz

4: 1.0870  
2.40000 GHz



裕庭工業有限公司  
YU TING INDUSTRIAL CO., LTD.

地址：台北縣三重市中興北街104巷7號  
ADD: NO. 7, LANE 104, CHUNG HSIN N STREET,  
SAN CHUNG CITY, TAIPEI HSIEN, TAIWAN, R.O.C.  
TEL:(02)85121166(REP)  
FAX:(02)29956607

渡層厚度報告單

FischerScope? XRAY XDL

日期:93.05.04

品名規格: 銅粒56 AU2U"

備註:D105

測試結果:

數據組編號: 1 2004/5/4 01:25:57 PM

n =	1	Au =	2.90 $\mu$ "
n =	2	Au =	2.02 $\mu$ "
n =	3	Au =	2.97 $\mu$ "
n =	4	Au =	2.30 $\mu$ "
n =	5	Au =	2.27 $\mu$ "

XRAY XDL

計算

2004/5/4 01:26:00 PM

產品名稱: AU/CU 黃銅 校正標準片

數據組編號:1 (2004/5/4 01:25:57 PM) 至 1 (2004/5/4 01:25:57 PM)

平均值	x. :	Au	2.49 $\mu$ "
密度	:		19.3
標準差	s :		0.418 $\mu$ "
變動率 C.O.V. (%)	V :		16.79 %
讀值數量	n :		5
範圍	R :		0.95 $\mu$ "
最小值	:		2.02 $\mu$ "
最大值	:		2.97 $\mu$ "

第一聯：客戶收執

	品 管		主 管	<b>合格章</b>	合 格 章
--	--------	--	--------	------------	-------------

FM0812



裕庭工業有限公司  
YU TING INDUSTRIAL CO., LTD.

地址：台北縣三重市中興北街104巷7號  
ADD: NO. 7, LANE 104, CHUNG HSIN N STREET,  
SAN CHUNG CITY, TAIPEI HSIEN, TAIWAN, R.O.C.  
TEL:(02)85121166(REP)  
FAX:(02)29956607

度層厚度報告單

Fischerscope XRAY XDL

日期:93.06.19

品名規格:銅粒40 AU2U"

備註:

測試結果:

數據組編號: 1 2004/6/19 04:23:50 PM

n =	1	Au =	2.55	μ"
n =	2	Au =	2.53	μ"
n =	3	Au =	2.66	μ"
n =	4	Au =	2.74	μ"
n =	5	Au =	2.41	μ"

XRAY XDL

計算

2004/6/19 04:24:15 PM

產品名稱: Au/Cu青

數據組編號:1 (2004/6/19 04:23:50 PM) 至 1 (2004/6/19 04:23:50 PM)

平均值	x. :	Au	2.58	μ"
測試時間	:		5	s
標準差	s :		0.125	μ"
變動率 C.O.V. (%)	V :		4.87	%
數值數量	n :		5	
範圍	R :		0.33	μ"
最小值	:		2.41	μ"
最大值	:		2.74	μ"

第一聯:客戶收

	品管		主管	合格章	合格章
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FM0812



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ADD: NO. 7, LANE 104, CHUNG HSIN N STREET,  
SAN CHUNG CITY, TAIPEI HSIEN, TAIWAN, R.O.C.  
TEL: (02)85121166 (REP.)  
FAX: (02)29956607

## 鍍層厚度報告單

Fischerscope XRAY XDL

日期: 93.06.19

品名規格: 銅粒32 AU2U"

備註: D105

測試結果:

數據組編號: 1 2004/6/19 02:11:28 PM

n =	1	Au =	2.89 $\mu$ "
n =	2	Au =	2.70 $\mu$ "
n =	3	Au =	2.31 $\mu$ "
n =	4	Au =	2.52 $\mu$ "
n =	5	Au =	2.12 $\mu$ "

XRAY XDL

計算

2004/6/19 02:12:11 PM

產品名稱: AU/CU 黃銅

數據組編號: 1 (2004/6/19 02:11:28 PM) 至 1 (2004/6/19 02:11:28 PM)

平均值	x. :	Au	2.51 $\mu$ "
測試時間	:		1 s
標準差	s :		0.304 $\mu$ "
變動率 C.O.V. (%)	V :		12.15 %
數值數量	n :		5
範圍	R :		0.77 $\mu$ "
最小值	:		2.12 $\mu$ "
最大值	:		2.89 $\mu$ "

第一聯：客戶此幸

	品 管		主 管		合 格 章
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FM0812



裕庭工業有限公司  
YU TING INDUSTRIAL CO., LTD.

地址：台北縣三重市中興北街104巷7號  
ADD: NO. 7, LANE 104, CHUNG HSIN N STREET,  
SAN CHUNG CITY, TAIPEI HSIEN, TAIWAN, R.O.C.  
TEL: (02)85121166(REP.)  
FAX: (02)29956607

度層厚度報告單

Fischerscope XRAY XDL

日期: 93.06.18

品名規格: PIN \ \ AU15U"

備註: D105

測試結果:

數據組編號: 1 2004/6/18 03:23:48 PM

n =	1	Au =	17.4 $\mu$ "
n =	2	Au =	18.8 $\mu$ "
n =	3	Au =	17.0 $\mu$ "
n =	4	Au =	17.0 $\mu$ "
n =	5	Au =	16.6 $\mu$ "

XRAY XDL

計算

2004/6/18 03:24:03 PM

產品名稱: Au/Cu青

數據組編號: 1 (2004/6/18 03:23:48 PM) 至 1 (2004/6/18 03:23:48 PM)

		Au	
平均值	x. :	17.4 $\mu$ "	
測試時間	:	1 s	
標準差	s :	0.864 $\mu$ "	
變動率 C.O.V. (%)	V :	4.98 %	
數值數量	n :	5	
範圍	R :	2.25 $\mu$ "	
最小值	:	16.6 $\mu$ "	
最大值	:	18.8 $\mu$ "	

第一聯：客戶收報

	品 管		主 管		合 格 章
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FM0812



# **Mini RF Coax Connector & Cable Assembly**

Cable Systems, Asia Pacific  
Global Communications, Computer & Consumer  
Electronics Business Unit  
Dec. 2002

# **CONTENT**

1. Application
2. Mini RF Coax PCB Connector
3. Mini RF Coax Plug Connector & Cable Ass'y

## **1. Application**

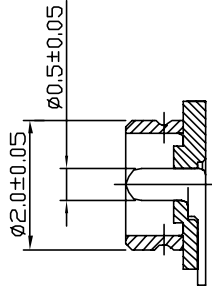
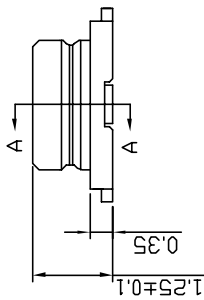
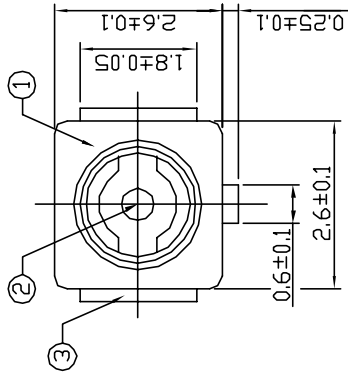
- 1a. Wireless LAN
- 1b. Desk Top Computer
- 1c. Note Book PC
- 1d. Mobile Phone
- 1e. PDA

## **2. Mini RF Coax PCB Connector**

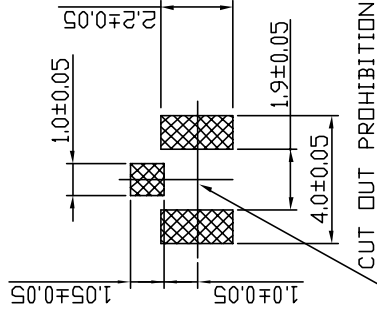
- 2a. Specification: as drawing
- 2b. Test Report (VSWR)

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DWG NO. C-1566230



A-A SECTION



RECOMMENDED P.C.B. PATTERN

**SPECIFICATIONS:**  
**MECHANICAL CHARACTERISTICS:**  
 MATING/UNMATING--30 CYCLES  
**ELECTRICAL CHARACTERISTICS:**  
 IMPEDANCE--50 OHMS  
 FREQUENCY RANGE--0-6 GHZ (VSWR--1.3 MAX.)  
 OPERATING VOLTAGE--500 VOLTS RMS  
 CONTACT RESISTANCE--CENTER CONTACT=20 MILLIOHMS MAX.  
 OUTER CONTACT=10 MILLIOHMS MAX.  
 DIELECTRIC WITHSTANDING VOLTAGE--200 VAC FOR 1 MIN.  
 CURRENT LEAKAGE 2mA MAX.  
 INSULATION RESISTANCE--500 MEGOHMS MIN.  
**ENVIRONMENTAL CHARACTERISTICS:**  
 TEMPERATURE RANGE-- -40°C TO +90°C

1	EA	1-1566230-3	GROUND CONTACT, BRASS WITH GOLD PLATING	3
1	EA	1-1566230-2	CENTER CONTACT, BRASS WITH GOLD PLATING	2
1	EA	1-1566230-1	HOUSING, LCP (UL94V-0)	1
QTY	U/M	PART NO.	DESCRIPTION	ITEM NO.

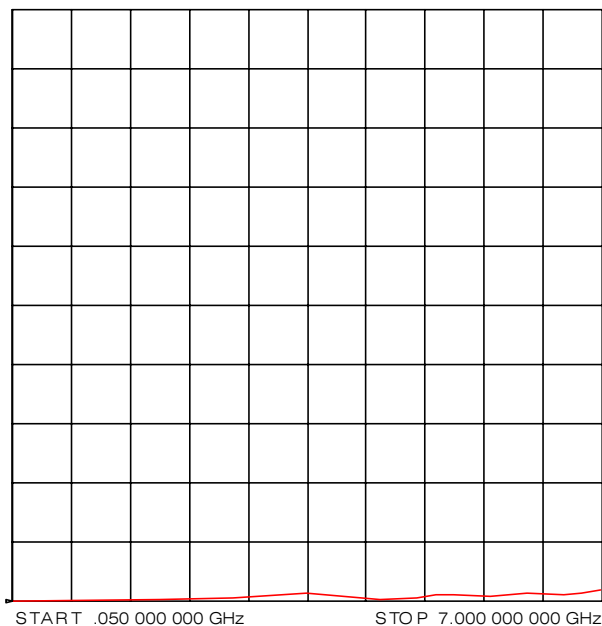
THIS DRAWING IS A CONTROLLING DOCUMENT FROM TYCO ELECTRONICS IT IS SUBJECT TO CHANGE AND SHOULD BE CONTACTED FOR THE LATEST REVISION	SIZE	SCALE	SHEET	REV	TYCO ELECTRONICS CABLE SYSTEMS ASIA PACIFIC
DIMENSIONS: TOLERANCES UNLESS OTHERWISE SPECIFIED:	A3	1	OF	1	
MM	DWN	ENG.			
0 PLC ± 1 PLC ± 2 PLC ± 3 PLC ±	CHK				
ANGLES ± SURFACE TEXTURE	APVD				
NAME	TYCO ELECTRONICS CABLE SYSTEMS ASIA PACIFIC				
VAD ITEM, MINI RF CDAX PCB RECE.	DRAWING NO. C-1566230				
CUSTOMER DRAWING	CUSTOMER DRAWING				

1566230-1	AS SHOWN
P/N	

LDC				
HY				
DIST				
	FZ10-0222-02	4.OCT.02'	MT	JP
LTR	REVISION RECORD	DATE	IDWN	APVE

# 2b. Test Report (VSWR)

CH1 B SWR 1 / REF 1 24 Oct 2002 17: 40: 35



24 Oct 2002 17: 40: 42

V.S.W.R  
STIMULUS

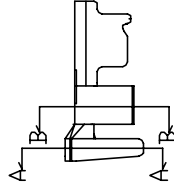
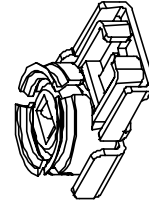
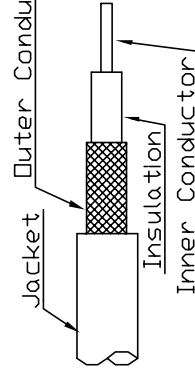
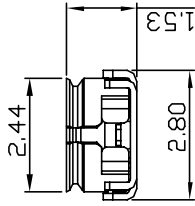
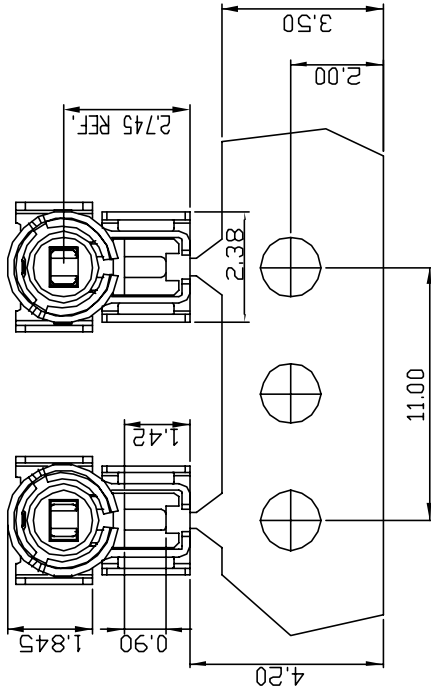
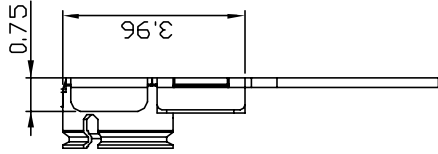
GHz	CH1 B	GHz	CH1 B
.050 000 000	1.0001 *	4.081 000 000	1.0443 *
.189 000 000	1.0015 *	4.220 000 000	1.046 *
.328 000 000	1.0057 *	4.359 000 000	1.0497 *
.467 000 000	1.0057 *	4.498 000 000	1.0601 *
.606 000 000	1.0106 *	4.637 000 000	1.0604 *
.745 000 000	1.0139 *	4.776 000 000	1.0505 *
.884 000 000	1.0179 *	4.915 000 000	1.0634 *
1.023 000 000	1.0263 *	5.054 000 000	1.0782 *
1.162 000 000	1.0439 *	5.193 000 000	1.0772 *
1.301 000 000	1.041 *	5.332 000 000	1.0775 *
1.440 000 000	1.0218 *	5.471 000 000	1.0678 *
1.579 000 000	1.0166 *	5.610 000 000	1.0712 *
1.718 000 000	1.0233 *	5.749 000 000	1.0894 *
1.857 000 000	1.0342 *	5.888 000 000	1.08 *
1.996 000 000	1.0479 *	6.027 000 000	1.0881 *
2.135 000 000	1.0513 *	6.166 000 000	1.0906 *
2.274 000 000	1.0431 *	6.305 000 000	1.0929 *
2.413 000 000	1.0361 *	6.444 000 000	1.0819 *
2.552 000 000	1.0266 *	6.583 000 000	1.1248 *
2.691 000 000	1.043 *	6.722 000 000	1.1298 *
2.830 000 000	1.0594 *	6.861 000 000	1.1117 *
2.969 000 000	1.0787 *	7.000 000 000	1.1278 *
3.108 000 000	1.0866 *		
3.247 000 000	1.0916 *		
3.386 000 000	1.0861 *		
3.525 000 000	1.0811 *		
3.664 000 000	1.075 *		
3.803 000 000	1.0639 *		
3.942 000 000	1.0477 *		

### **3. Mini RF Coax Plug Connector & Cable Ass'y**

- 3a. Mini RF Coax Plug Conn.
- 3b. Mini RF Coax Cable Ass'y
- 3c. Product Specification:
- 3d. Test Report: for Type I
- 3e. Test Report: for Type II

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DWG NO. C-1566412



PART NO.	1566412-1	1566412-2
	Ø1.32MM	Ø0.98MM
	Ø1.13MM	Ø0.80MM
	SECTION B-B	SECTION B-B
	SECTION A-A	SECTION A-A

1566412-2	Ø0.98MM	Ø0.80MM
1566412-1	Ø1.32MM	Ø1.13MM
P/N	JACKET	

APPLICABLE CABLE DIMENSION

LDC  
 HY  
 DIST

<input type="checkbox"/>	FZ10-0223-02	MT	JP
LTR	REVISION RECORD	DATE	IDW/APVE

THIS DRAWING IS A CONTROLLING DOCUMENT FROM TYCO ELECTRONICS. IT IS SUBJECT TO CHANGE AND SHOULD BE CONTACTED FOR THE LATEST REVISION.			
SIZE	SCALE	SHEET	REV
A3	—	1 OF 1	0
DWN	ENG.		
CHK			
APVD			
DIMENSIONS:	TOLERANCES UNLESS OTHERWISE SPECIFIED:		
MM	0 PLC ±		
	1 PLC ±		
	2 PLC ±		
	3 PLC ±		
ANGLES ±			
SURFACE			
TEXTURE			

TYCO ELECTRONICS	CABLE SYSTEMS
Electronics	ASIA PACIFIC
NAME	VAD ITEM, MINI RF COAX PLUG CONN. (TYPE 1)
DRAWING NO.	C-1566412
CUSTOMER DRAWING	

4

3

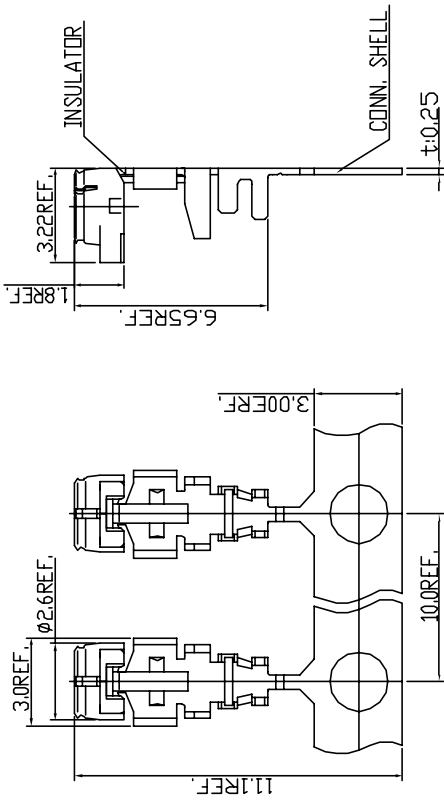
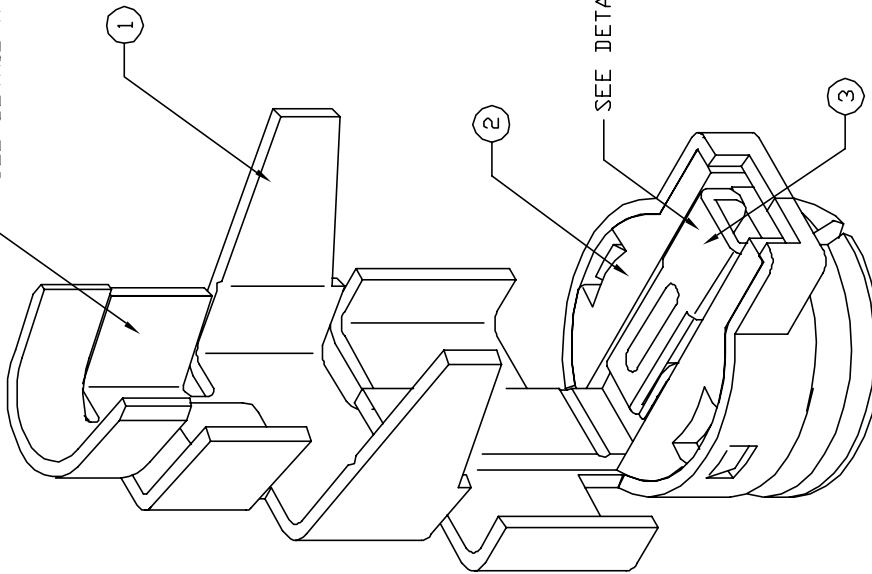
2

1

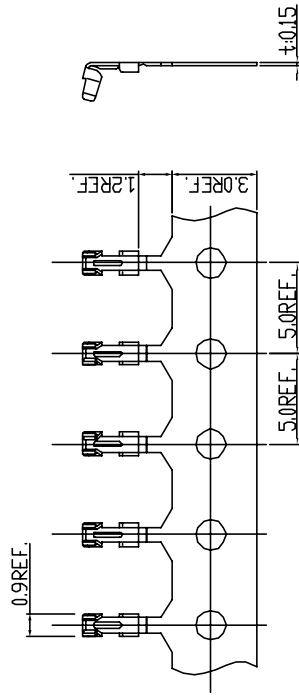
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DWG NO. C-1566284

SEE DETAIL A



DETAIL A



DETAIL B

U/M	Q'TY	PART NO.	DESCRIPTION	ITEM NO.
EA	1	1-1566284-3	INNER CONTACT	3
EA	1	1-1566284-2	INSULATOR	2
EA	1	1-1566284-1	PLUG SHELL	1

THIS DRAWING IS A CONTROLLING DOCUMENT FROM TYCO ELECTRONICS. IT IS SUBJECT TO CHANGE AND THE CONTROLLING ENGINEERING ORGANIZATION SHOULD BE CONTACTED FOR THE LATEST REVISION.

DIMENSIONS: TOLERANCES UNLESS OTHERWISE SPECIFIED:  
 MM  
 0 PLC ±  
 1 PLC ±  
 2 PLC ±  
 3 PLC ±

ANGLES ±  
 SURFACE TEXTURE

1566284-2	Ø0.98MM	Ø0.80MM
1566284-1	Ø1.32MM	Ø1.13MM
P/N	CABLE SPEC.	

<input type="checkbox"/>	FZ10-0289-02	7.NOV.02'	MT	JP
LTR	REVISION RECORD	DATE	IDWN/APVE	

LDC  
 HY  
 DIST

TYCO ELECTRONICS  
**tyco**  
 Cable Systems  
 ASIA PACIFIC

NAME: VAD ITEM, MINI RF  
 COAX PLUG CONN. (TYPE II)

DRAWING NO. C-1566284

CUSTOMER DRAWING

---

**VAO ITEM, MINI COAX RF**

---

- **Testing Item:**
  1. Contact resistance test
  2. Insulation resistance test
  3. Withstand voltage test
  4. Female contact holding force test
  5. Repetitive operation test
  6. Vibration test
  7. Shock test
  8. Humidity resistance test
  9. Temperature cycle
  10. Salt spray test
  
- **Testing Conditions:** According to applicant's specifications.
  1. Contact resistance test  
Test current: 100 mA  
Full scale voltage: 20mV
  2. Insulation resistance test  
Test voltage: 100 V<sub>DC</sub>  
Charge time: 1 min.  
Test position: between housing and pin.
  3. Withstand voltage test  
Test voltage: 200 V<sub>AC</sub>  
Duration: 1 min.  
Test position: between housing and pin
  4. Female contact holding force test  
Measured with a 0.475 pin gauge  
Speed: 12.5mm/min

---

DR	DATE	APVD	DATE
Mindy Tsai	13-FEB-2003	Jenny Pi	13-FEB-2002

---



5. Repetitive operation test (manual operation)

30 cycles of insertion and disengagement

Requirement: (1) The contact resistance value were measured after test.

(2) Contact resistance test condition: refer to item 1

6. Vibration test

Waveform: Sine wave

Frequency: 10 100 10Hz

Sweep time: 1 oct./min.

Amplitude: 1.5mm (10 45Hz)

Acceleration: 6g (45 100Hz)

Direction: X, Y, Z (3 axes)

Duration: 33 min./axis

Requirement: Discontinuity < 1  $\mu$  s

7. Shock test

Pulse shape: Half-sine pulse

Peak acceleration: 74 g

Duration of pulse: 11 ms

Direction:  $\pm X$ ,  $\pm Y$ ,  $\pm Z$  (6 directions)

Number of shock: 3 shocks/direction

Requirement Discontinuity < 1  $\mu$  s

8. Humidity resistance test

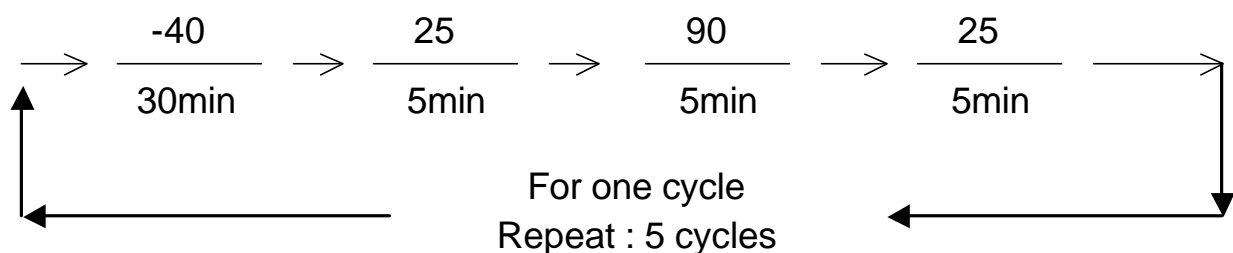
Temperature: 40

Humidity: 95% R.H

Duration: 96hrs

Requirement: The insulation resistance value of specimens were measured during in the chamber at 96<sup>th</sup> hrs..

9. Temperature cycle



Requirement: The contact resistance value of spiciness were measured after test.

10. Salt spray test  
Temperature: 35  
Concentration: 5% (by weight)  
Spray volume: 1 2 ml/hr.  
Duration: 48 hrs.

- **Testing Equipment:**

NAME	MODEL
DIGITAL MICRO-OHMMETER	VALHALLA SCIENTIFIC 4300B
HIGH RESISTANCE METER	HP-4339B
SALT SPRAY TEST CHAMBER	SQ-1000-ST-S
BREAKDOWN TESSTER	GPD-515AD
THERMAL SHOCK CHAMBER	TABAI TSA-71H
T&H CHAMBER	PR-2K
VIBRATION TEST SYSTEM	UD 452-SA15-ST
SHOCK TESTER	KD DP-1200-ST25
DISCONTINUITY TESTER	PW-TS711
TERMINAL STRENGTH TESTER	ALGOL SV-200LD & MAX-0001

- **Testing Result:**

1. Contact resistance test

Sample No.	Center resistance value (m )	Outside resistance value (m )
1-1	16.53	3.36
1-2	16.43	3.75
1.3	16.02	3.43
1-4	16.51	3.58
1-5	16.31	3.46

## 2. Insulation resistance test

Sample No.	Resistance value ( )
2-1	$1.6888 \times 10^{14}$
2-2	$3.3683 \times 10^{14}$
2-3	$2.5441 \times 10^{14}$
2-4	$1.3547 \times 10^{14}$
2-5	$1.4296 \times 10^{14}$

## 3. Withstand voltage test

Sample No.	Visual inspection
3-1	No damage.
3-2	No damage.
3-3	No damage.
3-4	No damage.
3-5	No damage.

## 4. Female contact holding force test

Sample No.	Force (N)
4-1	1.76
4-2	1.82
4-3	1.10
4-4	1.89
4-5	1.35

## 5. Repetitive operation test

Sample No.	Center resistance value (m )	Outside resistance value (m )
5-1	17.10	3.53
5-2	16.94	3.79
5-3	17.39	3.44
5-4	16.21	3.21
5-5	16.54	3.54

## 6. Vibration test

Sample No.	Visual inspection	Discontinuity
8-1	No damage.	<1 $\mu$ s
8-2	No damage.	<1 $\mu$ s
8-3	No damage.	<1 $\mu$ s
8-4	No damage.	<1 $\mu$ s
8-5	No damage.	<1 $\mu$ s

## 7. Shock test

Sample No.	Visual inspection	Discontinuity
8-1	No damage.	<1 $\mu$ s
8-2	No damage.	<1 $\mu$ s
8-3	No damage.	<1 $\mu$ s
8-4	No damage.	<1 $\mu$ s
8-5	No damage.	<1 $\mu$ s

## 8. Humidity resistance test

Sample No.	Resistance value ( )
2-1	$6.0789 \times 10^9$
2-2	$1.5842 \times 10^{10}$
2-3	$4.1835 \times 10^9$
2-4	$5.6047 \times 10^{10}$
2-5	$1.3838 \times 10^9$

## 9. Temperature cycle test

Sample No.	Center resistance value (m )	Outside resistance value (m )
6-1	15.97	3.42
6-2	15.55	3.70
6-3	16.06	3.43
6-4	16.05	3.38
6-5	15.58	3.25

## 10. Salt spray test

Sample No.	Visual inspection
7-1	Normal
7-2	Normal
7-3	Normal
7-4	Normal
7-5	Normal



# TEST REPORT

Ind. Ser. No. ET91T-12-071-E01

\*\*\*\*\*

Testing Item :

1. **Contact resistance test**
2. **Insulation resistance test**
3. **Withstand voltage test**
4. **Female contact holding force test**
5. **Repetitive operation test**
6. **Vibration test**
7. **Shock test**
8. **Humidity resistance test**
9. **Temperature cycle**
10. **Salt spray test**

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# TEST REPORT

Ind. Ser. No. ET91T-12-071-E01

\*\*\*\*\*

Testing Conditions : According to applicant's specifications.

**1. Contact resistance test**

Test current : 100 mA

Full scale voltage : 20 mV

**2. Insulation resistance test**

Test voltage : 100 V<sub>DC</sub>

Charge time : 1 min.

Test position : between housing and pin.

**3. Withstand voltage test**

Test voltage : 200 V<sub>AC</sub>

Duration : 1 min.

Test position : between housing and pin

**4. Female contact holding force test**

Measured with a  $\phi$  0.475 pin gauge

speed : 12.5mm/min

**5. Repetitive operation test(manual operation)**

30 cycles of insertion and disengagement

Requirement : (1)The contact resistance value were measured after test.

(2)Contact resistance test condition : refer to item 1



# TEST REPORT

Ind. Ser. No. ET91T-12-071-E01

\*\*\*\*\*

## 6. Vibration test

Waveform : Sine wave

Frequency : 10 ~ 100 ~ 10 Hz

Sweep time : 1 oct./ min.

Amplitude : 1.5 mm (10 ~45 Hz)

Acceleration : 6 g (45 ~ 100 Hz)

Direction : X, Y, Z (3 axes)

Duration : 33 min. / axis

Requirement : Discontinuity < 1 $\mu$ s

## 7. Shock test

Pulse shape : Half-sine pulse

Peak acceleration : 74 g

Duration of pulse : 11 ms

Direction :  $\pm$  X,  $\pm$  Y,  $\pm$  Z (6 directions)

Number of shock : 3 shocks / direction

Requirement : Discontinuity < 1 $\mu$ s



# TEST REPORT

Ind. Ser. No. ET91T-12-071-E01

\*\*\*\*\*

## 8. Humidity resistance test

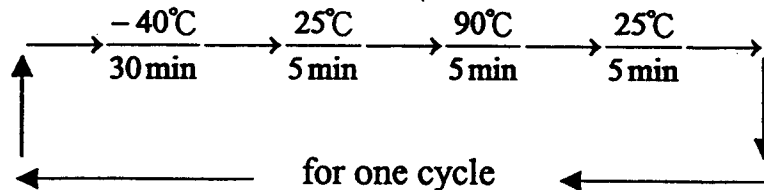
Temperature : 40°C

Humidity : 95% R.H

Duration : 96 hrs

Requirement : The insulation resistance value of specimens were measured during in the chamber at 96<sup>th</sup> hrs..

## 9. Temperature cycle



Repeat : 5 cycles

Requirement : The contact resistance value of spiciness were measured after test.

## 10. Salt spray test

Temperature : 35 °C

Concentration : 5 % (by weight)

Spray volume : 1 ~ 2 ml / hr.

Duration : 48 hrs.



# TEST REPORT

Ind. Ser. No. ET91T-12-071-E01

\*\*\*\*\*

## Testing Equipment :

NAME	MODEL
DIGITAL MICRO-OHMMETER	VALHALLA SCIENTIFIC 4300B
HIGH RESISTANCE METER	HP-4339B
SALT SPRAY TEST CHAMBER	SQ-1000-ST-S
BREAKDOWN TESSTER	GPD-515AD
THERMAL SHOCK CHAMBER	TABAI TSA-71H
T&H CHAMBER	PR-2K
VIBRATION TEST SYSTEM	UD 452-SA15-ST
SHOCK TESTER	KD DP-1200-ST25
DISCONTINUITY TESTER	PW-TS711
TERMINAL STRENGTH TESTER	ALGOL SV-200LD & MAX-0001

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# TEST REPORT

Ind. Ser. No. ET91T-12-071-E01

\*\*\*\*\*  
Testing Result :

## 1. Contact resistance test

Sample No.	Center resistance value (mΩ)	Outside resistance value (mΩ)
1-1	16.53	3.36
1-2	16.43	3.75
1-3	16.02	3.43
1-4	16.51	3.58
1-5	16.31	3.46

## 2. Insulation resistance test

Sample No.	Resistance value (Ω)
2-1	$1.6888 \times 10^{14}$
2-2	$3.3683 \times 10^{14}$
2-3	$2.5441 \times 10^{14}$
2-4	$1.3547 \times 10^{14}$
2-5	$1.4296 \times 10^{14}$

## 3. Withstand voltage test

Sample No.	Visual inspection
3-1	No damage.
3-2	No damage.
3-3	No damage.
3-4	No damage.
3-5	No damage.



# TEST REPORT

Ind. Ser. No. ET91T-12-071-E01

\*\*\*\*\*

## 4. Female contact holding force test

Sample No.	Force (N)
4-1	1.76
4-2	1.82
4-3	1.10
4-4	1.89
4-5	1.35

## 5. Repetitive operation test

Sample No.	Center resistance value (mΩ)	Outside resistance value (mΩ)
5-1	17.10	3.53
5-2	16.94	3.79
5-3	17.39	3.44
5-4	16.21	3.21
3-5	16.51	3.54

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# TEST REPORT

Ind. Ser. No. ET91T-12-071-E01

\*\*\*\*\*

## 6. Vibration test

Sample No.	Visual inspection	Discontinuity
8-1	No damage.	$<1 \mu s$
8-2	No damage.	$<1 \mu s$
8-3	No damage.	$<1 \mu s$
8-4	No damage.	$<1 \mu s$
8-5	No damage.	$<1 \mu s$

## 7. Shock test

Sample No.	Visual inspection	Discontinuity
8-1	No damage.	$<1 \mu s$
8-2	No damage.	$<1 \mu s$
8-3	No damage.	$<1 \mu s$
8-4	No damage.	$<1 \mu s$
8-5	No damage.	$<1 \mu s$

## 8. Humidity resistance test

Sample No.	Resistance value ( $\Omega$ )
2-1	$6.0789 \times 10^9$
2-2	$1.5842 \times 10^{10}$
2-3	$4.1835 \times 10^9$
2-4	$5.6047 \times 10^{10}$
2-5	$1.3838 \times 10^9$



# TEST REPORT

Ind. Ser. No. ET91T-12-071-E01

\*\*\*\*\*

## 9. Temperature cycle test

Sample No.	Center resistance value (mΩ)	Outside resistance value (mΩ)
6-1	15.97	3.42
6-2	15.55	3.70
6-3	16.06	3.43
6-4	16.05	3.38
6-5	15.58	3.25

## 10. Salt spray test

Sample No.	Visual inspection
7-1	Normal
7-2	Normal
7-3	Normal
7-4	Normal
7-5	Normal

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Deming Chang  
Tester

# Tyco Electronics Taiwan Co., Ltd.

- Tyco Mini RF SMT Board Side Connector with I-PEX & Hirose Connector

VSWR and Pull Force Compare

頻譜分析儀：HP8720D

拉力計：瑞昌 1344TP

TEST CABLE Plug：Hirose U.FL-LP-066

測試頻段：6 GHZ

Hirose spec.：VSWR 1.3 MAX.

		Tyco socket connector					I-PEX socket connector					Hirose socket connector				
插拔次數	樣品編號	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
	1	<b>Pull Force</b>	2.1kg	2.1kg	2.0kg	1.9kg	2.1kg	2.0kg	2.0kg	1.9kg	1.9kg	2.0kg	2.1kg	1.9kg	2.0kg	1.8kg
<b>VSWR</b>		1.20	1.18	1.19	1.19	1.20	1.20	1.19	1.20	1.21	1.19	1.20	1.19	1.20	1.19	1.21
5	<b>Pull Force</b>	2.1kg	2.0kg	2.0kg	1.8kg	2.0kg	1.9kg	2.0kg	1.8kg	1.9kg	1.9kg	1.9kg	1.8kg	1.9kg	1.7kg	1.8kg
	<b>VSWR</b>	1.21	1.20	1.21	1.20	1.19	1.20	1.19	1.21	1.21	1.21	1.20	1.20	1.20	1.20	1.21
10	<b>Pull Force</b>	2.0kg	2.0kg	1.9kg	1.8kg	1.9kg	1.9kg	1.9kg	1.8kg	1.8kg	1.8kg	1.9kg	1.7kg	1.7kg	1.6kg	1.7kg
	<b>VSWR</b>	1.21	1.22	1.22	1.20	1.21	1.22	1.21	1.23	1.22	1.20	1.22	1.22	1.21	1.20	1.23
15	<b>Pull Force</b>	1.9kg	1.9kg	1.8kg	1.7kg	1.8kg	1.8kg	1.8kg	1.7kg	1.7kg	1.8kg	1.8kg	1.6kg	1.7kg	1.6kg	1.7kg
	<b>VSWR</b>	1.20	1.22	1.24	1.24	1.23	1.24	1.22	1.23	1.24	1.23	1.23	1.23	1.23	1.22	1.24
20	<b>Pull Force</b>	1.8kg	1.9kg	1.8kg	1.6kg	1.7kg	1.7kg	1.7kg	1.6kg	1.6kg	1.7kg	1.7kg	1.6kg	1.6kg	1.5kg	1.6kg
	<b>VSWR</b>	1.21	1.23	1.24	1.25	1.24	1.25	1.24	1.25	1.23	1.24	1.24	1.26	1.24	1.25	1.26
25	<b>Pull Force</b>	1.6kg	1.8kg	1.7kg	1.6kg	1.6kg	1.6kg	1.7kg	1.6kg	1.6kg	1.6kg	1.6kg	1.5kg	1.6kg	1.4kg	1.6kg
	<b>VSWR</b>	1.26	1.25	1.26	1.27	1.27	1.26	1.27	1.26	1.25	1.26	1.26	1.27	1.25	1.26	1.27
30	<b>Pull Force</b>	1.5kg	1.7kg	1.6kg	1.5kg	1.5kg	1.4kg	1.6kg	1.5kg	1.4kg	1.5kg	1.5kg	1.4kg	1.5kg	1.3kg	1.5kg
	<b>VSWR</b>	1.27	1.26	1.28	1.28	1.28	1.28	1.27	1.29	1.26	1.28	1.28	1.29	1.26	1.27	1.29

## Tyco Mini RF Cable Side Connector with Hirose Cable Side Connector Compare Test

• Test Board Side Connector: Hirose U.FL-R-SMT

### • Test Result

#### \*V.S.W.R.

Item	1st time	5times	10times	15times	20times	25times	30times
Tyco(1)	1.197	1.203	1.208	1.196	1.176	1.225	1.201
Tyco(2)	1.199	1.206	1.188	1.197	1.195	1.200	1.220
Tyco(3)	1.225	1.199	1.197	1.210	1.215	1.211	1.208
Tyco(4)	1.200	1.220	1.206	1.199	1.214	1.204	1.206
Tyco(5)	1.141	1.166	1.158	1.155	1.148	1.149	1.170
Hirose(1)	1.195	1.200	1.198	1.199	1.201	1.184	1.192
Hirose(2)	1.267	1.255	1.249	1.274	1.263	1.260	1.251
Hirose(3)	1.166	1.170	1.169	1.165	1.189	1.180	1.197
Hirose(4)	1.160	1.180	1.174	1.170	1.171	1.166	1.168
Hirose(5)	1.263	1.265	1.263	1.260	1.251	1.270	1.258

#### \*Insertion Loss

Item	1st time	5times	10times	15times	20times	25times	30times
Tyco(1)	6.080	6.110	6.103	6.130	6.124	6.158	6.210
Tyco(2)	6.230	6.245	6.203	6.244	6.275	6.263	6.252
Tyco(3)	6.350	6.331	6.352	6.350	6.348	6.345	6.359
Tyco(4)	6.331	6.380	6.340	6.350	6.333	6.344	6.339
Tyco(5)	6.213	6.200	6.265	6.253	6.244	6.242	6.253
Hirose(1)	6.501	6.488	6.459	6.500	6.479	6.477	6.460
Hirose(2)	6.350	6.355	6.380	6.331	6.371	6.389	6.372
Hirose(3)	6.451	6.446	6.453	6.444	6.449	6.480	6.420
Hirose(4)	6.249	6.300	6.277	6.275	6.279	6.301	6.276
Hirose(5)	6.473	6.456	6.421	6.495	6.475	6.430	6.457

#### \*Pull Force

Item	1st time(Kg)	5times	10times	15times	20times	25times	30times
Tyco(1)	1.60	1.50	1.50	1.48	1.43	1.34	1.30
Tyco(2)	1.52	1.47	1.50	1.47	1.39	1.40	1.35
Tyco(3)	1.55	1.52	1.46	1.42	1.42	1.43	1.34
Tyco(4)	1.60	1.54	1.50	1.46	1.44	1.40	1.31
Tyco(5)	1.72	1.58	1.57	1.49	1.47	1.45	1.40
Hirose(1)	1.56	1.49	1.49	1.45	1.46	1.37	1.33
Hirose(2)	1.58	1.50	1.51	1.43	1.38	1.32	1.29
Hirose(3)	1.61	1.51	1.49	1.47	1.40	1.45	1.39
Hirose(4)	1.54	1.47	1.45	1.50	1.44	1.46	1.35
Hirose(5)	1.51	1.50	1.48	1.46	1.39	1.39	1.33



## ▼ Sumitube F(Z)

UL224 approved flame-retardant heat-shrinkable tubing/the maximum operating temperature is 105°C

Basic Properties | Features & Benefits | Specifications & Approval  
Shrinkage-Temperature Curves | Markings | Applications | Colors |  
Properties | Sizes

### ■ Basic Properties

- |   |   |
|---|---|
| 1) Materials                              | : Cross-linked,<br>flexible,<br>flame-retardant<br>polyolefin resin |
| 2) Shrink<br>temperature                  | : 90°C min.   |
| 3) Shrink ratio<br>(Radial change)        | : 50% min.  |
| 4) Longitudinal<br>change                 | : -15% min.   |
| 5) Continuous<br>operating<br>temperature | : -55 to 105°C  |

### ■ Features & Benefits

- 1) Compliant with UL224
- 2) Flexible
- 3) Flame-retardant

### ■ Specifications / Approvals

UL224

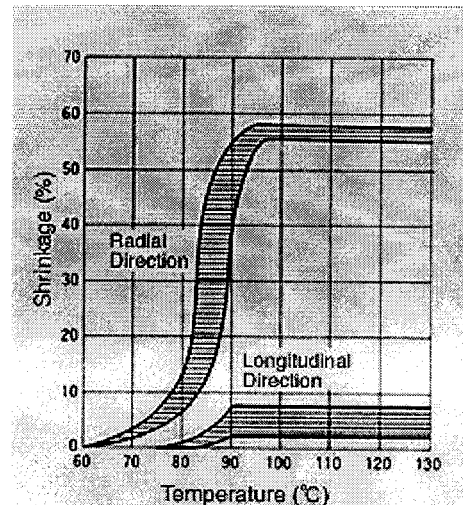
File No. : E48762  
 Catalogue No. : SUMITUBE F(Z) or 939  
 Operating temperature : 105°C  
 Voltage rating : 600V  
 Flammability rating : VW-1

Electrical Appliance and Material Control Law  
 Optional Registration System of Compounds and Materials  
 Registration of flammability rating (-F-)  
 (Registration No. : F-STS3-009 to F-STS3-012)

### ■ Markings

The following letters are printed on the surface of Sumitube F(Z).  
 VW-1 -F- ◆ SUMITOMO-K SUMITUBE F(Z) CAT 939 105°C

### ■ Shrinkage-Temperature Curve



The above curve chart shows the shrink ratio in each direction. The shrink ratio in longitudinal direction should be indicated with negative sign.  
 (ex. 15% → -15%)

## ■ Applications

- 1) Insulation, protection and reinforcement of terminations and joints of electric wires
- 2) Color identification and bundling of electric wires
- 3) Insulation and protection of resistances and capacitors

## ■ Colors

Standard colors : Black, brown, red, orange, yellow, green, blue, violet, gray, and white

## ■ Properties [UL224]

Properties	Items	Requirements	Typical Values*
Mechanical	Tensile Strength (before aging)	10.4MPa min.	12.2MPa
	Tensile Strength (after aging)	136°C × 7 days, 7.3MPa min.	14.8MPa
	Ultimate Elongation (before aging)	200% min.	330%
	Ultimate Elongation (after aging)	136°C × 7 days, 100% min.	320%
	Heat Shock	250°C × 4 hour, No cracking	Pass
	Cold Bend	-30°C × 1 hour, No cracking	Pass
Electrical	Dielectric Voltage Withstand (before aging)	AC2.5kV × 60sec. No breakdown	Pass
	Dielectric Voltage Withstand (after aging)	136°C × 7 days, AC2.5kV × 60sec. No breakdown	Pass
	Dielectric Voltage Breakdown (before aging)	AC2.5kV min.	24.2kV
	Dielectric Voltage Breakdown (after aging)	136°C × 7 days, Percent of original 50%, and AC2.5kV min.	Pass
Chemical	Volume Resistivity	10 <sup>14</sup> Ω•cm min.	4.5 × 10 <sup>15</sup> Ω•cm
	Copper Corrosion	After leaving for 24hours at humidity 95% and temperature 23°C 136°C × 7 days, No corrosion	Pass
	Copper Stability	After leaving for 24hours at humidity 95% and temperature 23°C, 136°C × 7 days, Elongation 100% min.	290%
	Flammability	Flame-retardant, Pass VW-1	Pass

\*Not guaranteed values

## Sizes

Nominal Size (mm)	As Supplied (mm)		After Full Recovery (mm)		Unit Length (min.)(m)	
	Inside Diameter	Wall Thickness (nom.)	Inside Diameter (max.)	Wall Thickness (min.)	Cut	Spool
1 × 0.2	1.30±0.30	0.20	0.50	0.33	1	200
1.5 × 0.2	2.00±0.30	0.20	0.75	0.36	1	200
2 × 0.2	2.50±0.30	0.20	1.00	0.44	1	200
2.5 × 0.25	3.00±0.30	0.25	1.25	0.44	1	200
3 × 0.25	3.50±0.30	0.25	1.50	0.44	1	200
3.5 × 0.25	4.00±0.30	0.25	1.75	0.44	1	200
4 × 0.25	4.50±0.30	0.25	2.00	0.44	1	200
5 × 0.25	5.40±0.30	0.25	2.50	0.56	1	100
6 × 0.25	6.4±0.4	0.25	3.00	0.56	1	100
7 × 0.25	7.4±0.4	0.25	3.50	0.56	1	50
8 × 0.25	8.4±0.4	0.25	4.00	0.56	1	50
9 × 0.25	9.4±0.4	0.25	4.50	0.56	1	50
10 × 0.25	10.4±0.4	0.25	5.00	0.56	1	50
11 × 0.25	11.4±0.4	0.25	5.50	0.56	1	50
12 × 0.25	12.4±0.4	0.25	6.0	0.56	1	50
13 × 0.3	13.5±0.4	0.30	6.5	0.69	1	50
14 × 0.3	14.5±0.4	0.30	7.0	0.69	1	50
15 × 0.3	15.5±0.4	0.30	7.5	0.69	1	50
16 × 0.3	16.8±0.5	0.30	8.0	0.69	1	50
18 × 0.35	18.7±0.5	0.35	9.0	0.77	1	50
20 × 0.35	21.2±0.6	0.35	10.0	0.77	1	50
22 × 0.4	23.2±0.6	0.40	11.0	0.77	1	50
25 × 0.4	26.1±0.8	0.40	12.5	0.87	1	50
30 × 0.5	32.0±1.0	0.50	15.0	0.87	1	50
40 × 0.5	43.0±1.5	0.50	20.0	0.97	1	50
50 × 0.5	53.0±2.0	0.50	25.0	0.97	1	50

▲Caution!

All statements and technical information contained herein are based on tests we believe to be liable and only general properties are described. Therefore, safety of each specific application by the users should not be guaranteed. The users themselves should determine product conformance to your specific applications and assume all responsibility for all damages that may be caused directly or indirectly when using the products.