

APPROVAL SHEET

CUSTOMER : 友訊科技股份有限公司
D-LINK Corporation

MODEL NO. : **FHF-618-120-1**

DESCRIPTION : **Tri-Band Flying Lead
Straight Antenna**

Customer Approval

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士誼科技事業有限公司
JOYMAX ELECTRONICS CORP.

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E-Mail : ericlai@joymax.com.tw

1. Description:

The Antenna is Tri-band flying lead and straight antenna. Which is useful for the construction of an Access Point.

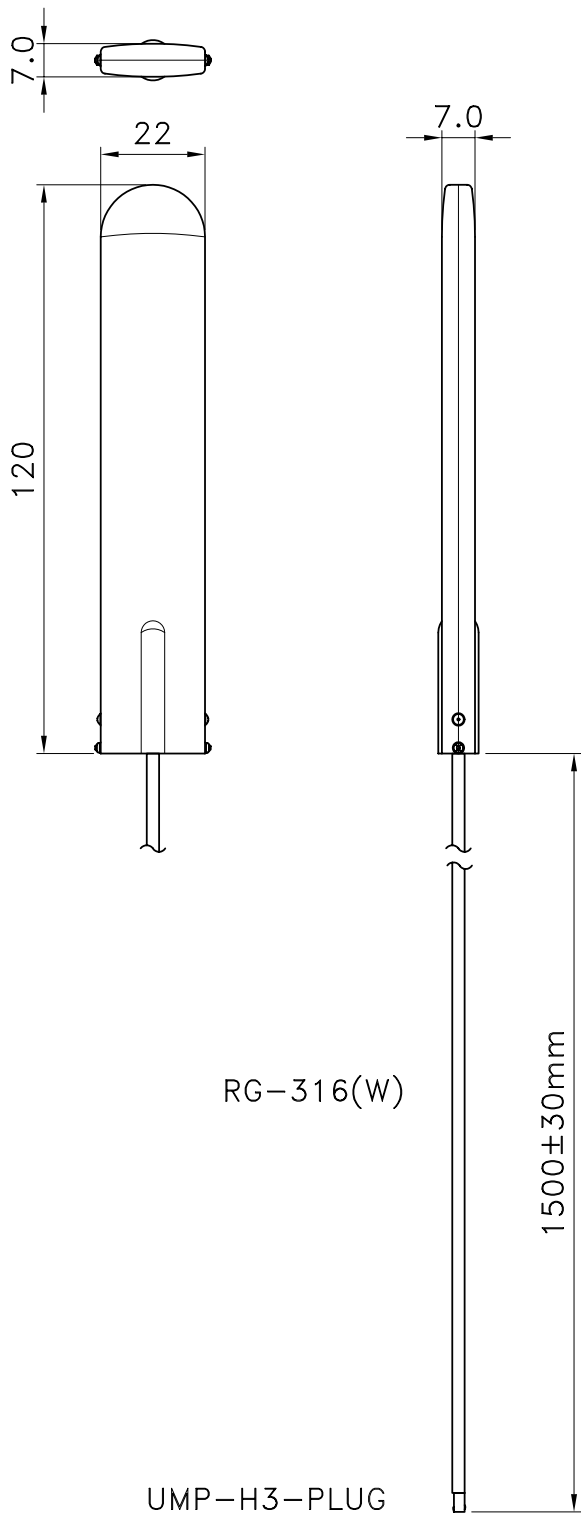
2. Electrical Properties

2-1 Frequency Range.....	2.4~2.4835GHz 5.15~5.35GHz 5.725~5.85GHz
2-2 Impedance.....	50 Ohms nominal
2-3 SWR.....	≤ 2.0
2-4 Return Loss.....	≤ -9.6 dB
2-5 Gain.....	5.6 dBi (peak) 4.5dBi (av.)
2-6 Polarization.....	Vertical

3. Mechanical Properties :

3-1 Connector.....	UMP-H3- Plug
3-2 Cable.....	M17/113-RG316
3-3 Houshing.....	Cycoloy-C2800
3-4 PCB.....	Ro4003
3-5 Attachment Strength.....	5.0 Kg-cm





TOLERANCES:	
X	± 0.2
X.X	± 0.15
X.XX	± 0.1
ANG.	± 0.5°

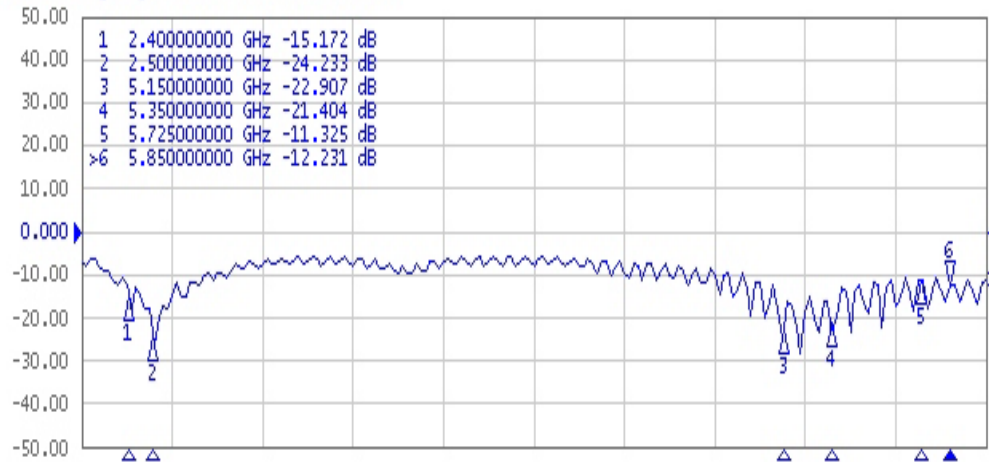
REV DESCRIPTION	MATERIAL	MODEL: <i>FHF-618-120-1</i>		
	FINISH	NAME: Straight Antenna		
	UNIT: mm	PART No: FHF-618-120-1		
	SCALE: 1/ 1.5	DESIGN	APPROVE	REV
	DATE: 08/21/2002	<i>J.F.Lin</i>	<i>Sen8/21</i>	<i>00</i>

QP0502-01-01



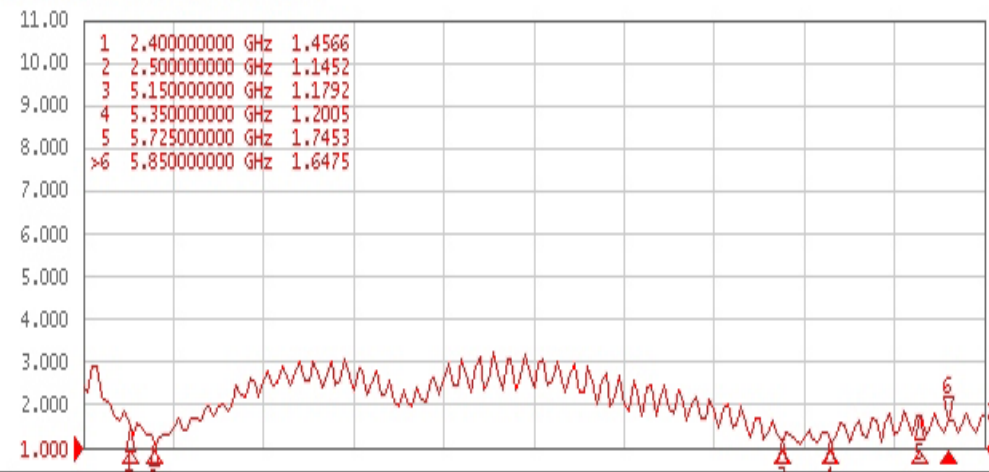
Return Loss

Tr1 S44 Log Mag 10.00dB/ Ref 0.000dB [R0]



SWR

Tr2 S44 SWR 1.000/ Ref 1.000 [R0]



Start 2.2 GHz IFBW 70 kHz Stop 6 GHz Cor |

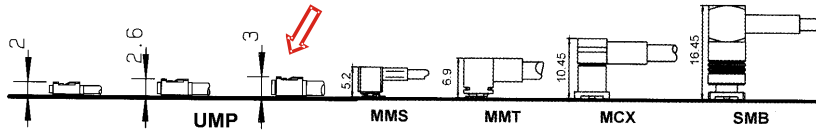
Meas Stop ExtRef Ready Svc 2002-08-20 08:27

UMP

INTRODUCTION

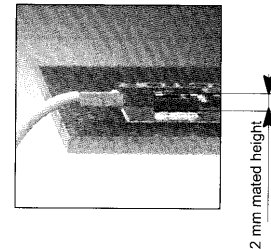


The **Ultra Miniature Pressure** contact (**UMP**) from **Radiall** features high RF performance in the world's lowest profile (2 mm mated height). Packaged in tape & reel, the **UMP** is ideal for high volume applications. The **UMP** can be used on board or edge applications and can be used in conjunction with external or embedded antennas. There are 3 different heights (2, 2.6 and 3 mm) available in the 3 types of connection (lock, snap-on and slide-on)



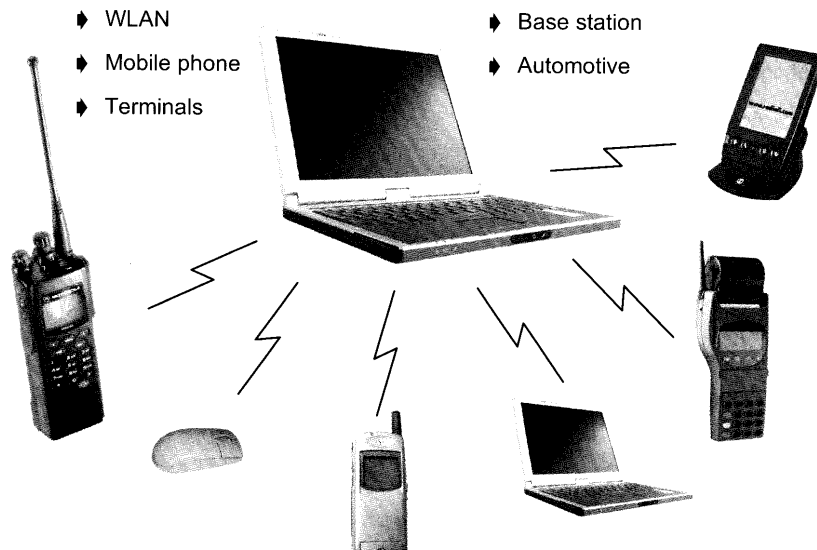
Main product interest

- World's lowest profile: < 2mm
- High density: UMP receptacle needs only 15.8mm² on board (4.4 x 3.6mm)
- World's lightest (0.003g for the receptacle and 0.08g for the plug)
- Small space for connection: needs only 2 mm of height
- Cost effective solution: 1 coax connector only
- Coupling mechanism choice (lock, snap-on, slide-on)



Applications:

UMP cable can be used on board-to-board (or board-to-antenna) applications:



UMP

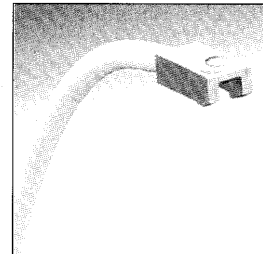
INTRODUCTION

Key specifications:

- Operating frequency: DC-6 GHz
- Typical VSWR:

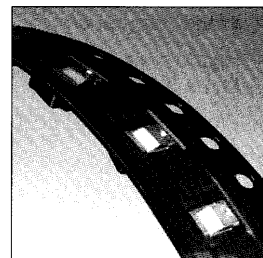
Frequency	Value
2 GHz	1.07:1
4 GHz	1.12:1
6 GHz	1.20:1
- Max. insertion loss (dB) : 0.2√F
- RF leakage (dB): -40 at 2 GHz
- Durability:

100 matings min (lock plug)
500 matings min (snap-on plug)
1500 matings (slide-on plug)
- Cable retention force (1 mm cable) : 20N
- Plating : gold



Pick and place & packaging :

- Design adapted to automated pick and place machines. The footprint of UMP allows video positioning by using the component's shadow to facilitate its placement



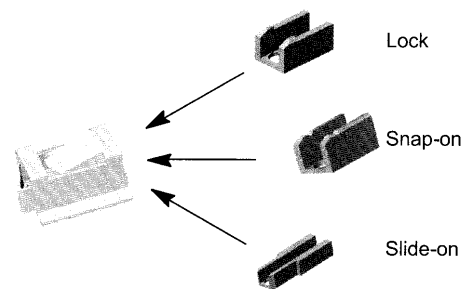
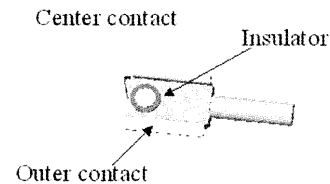
- Packaging : The **UMP** receptacle is packaged in reels of plastic embossed tape containing either 100 or 4000 pieces.

Type of mating :

Only 1 coaxial connector

With 3 types of connection :

- lock : *no risk of disconnection
*need a disconnecting tool
*number of matings < 100
*withstands severe vibrations
- snap-on : *disconnectable without tooling (small retention)
*number of matings < 500
*use in development or in perfecting stage
*easy maintenance
- slide-on : * disconnectable without tooling (no retention)
· number of matings < 1500
· use in tests



Plugs exist in the 3 types of mating (lock, snap-on and slide-on) for each height of receptacles (2, 2.6 and 3 mm).



UMP

CHARACTERISTICS



	TEST STANDARD	RESULTS
ELECTRICAL		
Impedance	CE CC 22 000	50 Ω
Frequency range		DC - 6 GHz
Max VSWR (mated connectors)		1.05 + 0.03 F
Max Insertion loss (dB)		0.2 √F
RF leakage (dB)		- 40 at 2 GHz
Insulation resistance		1000 MΩ min
Contact resistance center contact outer contact		60 mΩ 10 mΩ
Working voltage in VRMS		100
Dielectric withstanding voltage in VRMS		350

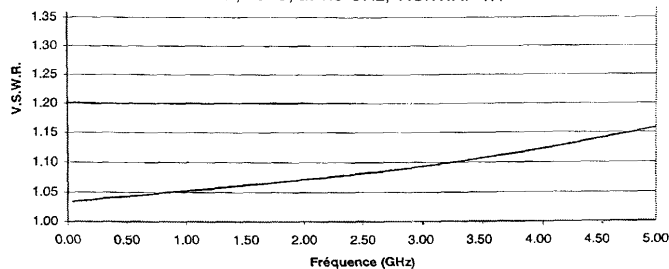
MECHANICAL		
Durability	CE CC 22 000	100 matings min
Force to engage		5 N
Cable retention force cable 1/50		20 N
Sine vibrations	IEC 68-2-6	passed
Random vibrations	IEC 68-2-36	passed
Shocks	IEC 68-2-29	50 g / 11 ms half sinus 3 shocks / 3 directions/2 senses
Retention on test board		20 N min
Damp heat	IEC 68-2-56	passed
Weight (g) receptacle plug		0.03 0.08

ENVIRONMENTAL		
Temperature range	CE CC 22 000	- 40/+90°C

MATERIALS		
Bodies plug receptacle		Brass Beryllium copper
Center contact		Brass
Outer contact		Beryllium copper
Insulator		PTFE

PLATINGS		
Bodies		Gold
Center contact		Gold
Outer contact		Gold

Power : P= 50 W at sea level, 40°C, at 1.8 GHz, V.S.W.R.=1.1



Frequency	Typical VSWR
1 GHz	1.05
2 GHz	1.07
3 GHz	1.09
4 GHz	1.12
5 GHz	1.16
6 GHz	1.20

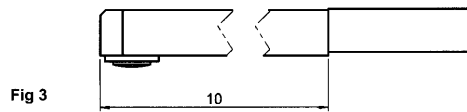
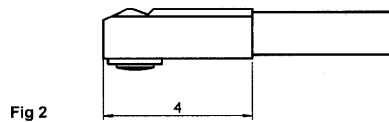
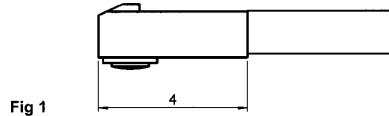
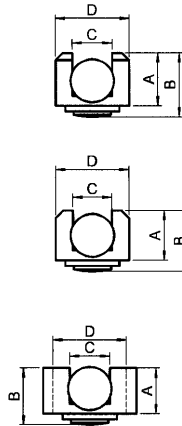
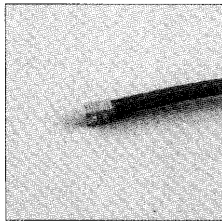


UMP

HEIGHT : 3 mm



UMP H3 PLUGS (solder type)

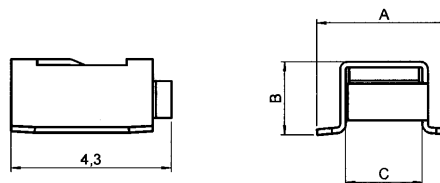
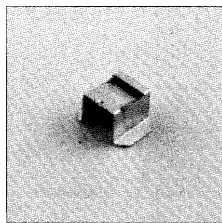


Note : **PLUGS** available **ONLY** as part of a pigtail or as part of a cable assembly.

Cable	part number	fig	dimension (mm)				finish	connection	packaging
			A	B	C	D			
2/50/D	R107 301 190	1	2.44	2.84	1.9	2.82	gold	lock	1
2.6/50/S	R107 301 200	1	2.44	2.84	2.3	2.82	gold	lock	1
2.6/50/S	R107 311 020	2	2.44	2.84	2.3	2.82	gold	snap on	1
2.6/50/S	R107 321 020	3	2.44	2.74	2.3	2.82	gold	slide on	1

See page 15 for order information.

SMT RECEPTACLES (3mm height)



Only interchangeable with plugs part of pigtails or cable assemblies indicated on page 13.

part number	dimension (mm)			finish	packaging	reel dimensions (mm)	recommended use for
	A	B	C				
R107 303 030	5.5	3	2.95	gold	2800 pces	330	mass production
R107 303 040	5.5	3	2.95	gold	100 pces	180	pre-series
R107 303 040W	5.5	3	2.95	gold	1		sampling

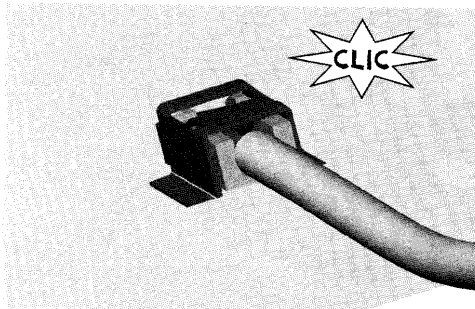
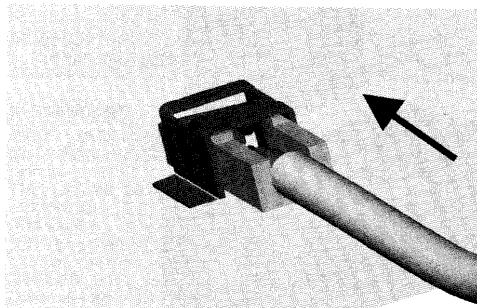
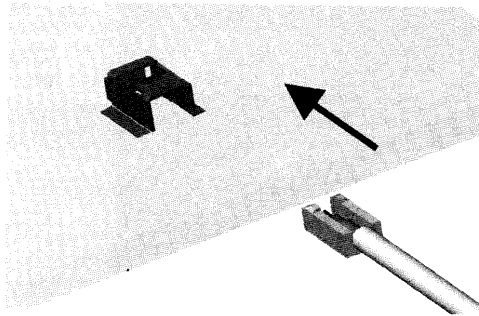
Please see soldering procedure on pages 18, 19 and 20.



UMP

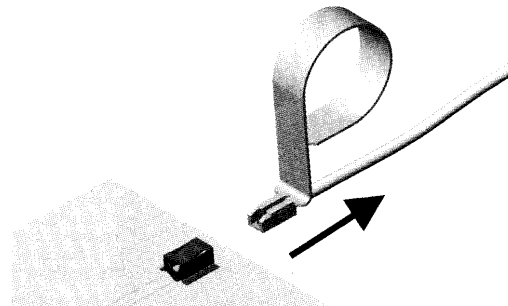
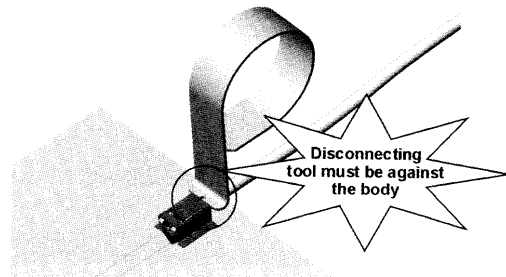
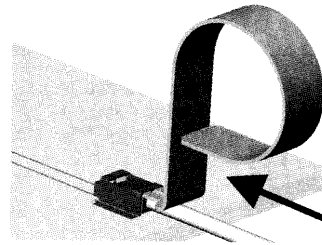
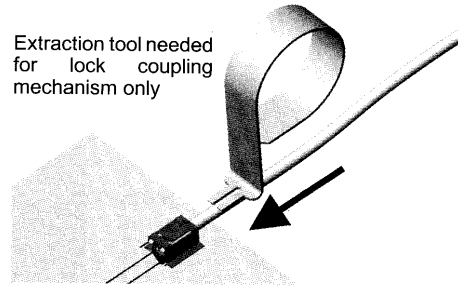
CONNECTION AND EXTRACTION

CONNECTION



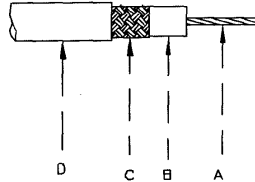
**Axial disconnection
EXTRACTION**

Extraction tool needed
for lock coupling
mechanism only



alldata\drawings\black

Rev	Change	Date



Construction:

- A) Center Conductor:
26 7/.0067 SPCW
OD .020" ± .001"
- B) Dielectric:
Extruded PTFE
OD .060" ± .003"
- C) Shield:
38 AWG SPC
OD .078" Nom.
- D) Jacket:
FEP - Brown Tint
OD .098" ± .005"
Surface Printed: "RG316HF HARBOUR INDUSTRIES 27478"

Electricals:

- Impedance: 50 ± 2 Ohms
- Capacitance: 32 pF/ft Max.
- Velocity of Prop.: 70% Nom.
- Cut off Frequency: 65 GHz

Physical Properties:

- Weight per 1000 ft: 12.2 lbs Max.
- Minimum Bend Radius: .5"
- Operating Temperature Range: -55° C to +200° C

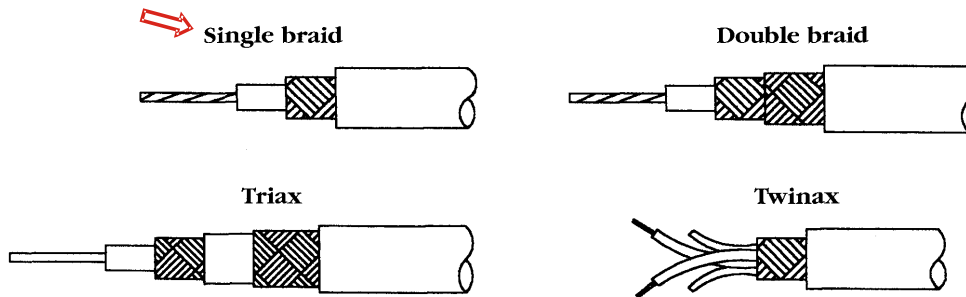
Attenuation:

1.0 GHz	25.7 dB/100ft.
2.0 GHz	37.0 dB/100ft.
3.0 GHz	46.0 dB/100ft.
4.0 GHz	53.8 dB/100ft.
5.0 GHz	60.9 dB/100ft.
6.0 GHz	67.3 dB/100ft.

<i>Harbour Industries</i>		
Date: 12/17/01	Scale: None	Drawn By: MTPiner
Drawing Name: RG316HF	Rev:	Approved By: <i>MTPiner</i> Sheet 1 of 1
Part Number: T80	Drawing Number: 121701	



MIL-C-17 Coax Cable – QPL Approved



Harbour supplies a complete line of high temperature, high performance QPL approved MIL-C-17 coax cables for the military, commercial and industrial markets. The specific M17 constructions referenced are manufactured in accordance with the most recent revision of the MIL-C-17 specification to ensure a quality product. The MIL-C-17 specification defines complete physical and electrical characteristics for each M17 part number, including diameter parameters, dielectric materials, braid coverage, maximum attenuation, and VSWR levels.

VSWR Sweep testing

When selecting a 50 ohm coaxial cable, constructions with VSWR requirements are recommended. Manufacturing and sweep testing cables with concern for VSWR ensures a quality cable free of spikes over the referenced frequency range. (Note the test frequencies specified in the electrical characteristics section.)

Precision PTFE Dielectrics

All of the high temperature, high performance coax cables listed have PTFE dielectrics with high dielectric strength and low capacitance in proportion to the dielectric constant. All PTFE dielectrics are manufactured with tolerances tighter than the MIL-C-17 specification to ensure uniformity of electrical characteristics, especially impedance, attenuation and VSWR.

Tape wrapped PTFE Constructions

Harbour also manufactures PTFE tape wrapped cables to a previous revision of the MIL-C-17 specification. These constructions can withstand operating temperatures up to 250° C. versus 200° C. for FEP jacketed cables. Also, PTFE tape wrapped cables are generally more flexible than their FEP jacketed counterparts.

UL Approvals

All of Harbour's M17 part numbers manufactured to the MIL-C-17 specification may be ordered with **UL 1971** and **FT4/FT6** approvals.





GE Plastics

Product Quality Documentation

Certificate of Compliance

Lot Number 721183		Material Grade & Color CYCOLOY C2800 111	
Qty Shipped 19800	UOM Kilogram	Shipped From GE Plastics Singapore Pte Ltd	Production Date 01 Apr 2002

IT IS HEREBY CERTIFIED THAT THE PRODUCT INDICATED ABOVE CONFORMS TO OUR STANDARD INTERNAL SPECIFICATIONS FOR THE DESIGNATED MATERIAL. THIS CERTIFICATION IS SUBJECT TO OUR STANDARD CONDITIONS OF SALE APPLYING TO PRODUCTS SOLD BY THE GENERAL ELECTRIC COMPANY.

TEST	REFERENCE	REQUIREMENT	RESULTS	UOM
Melt Flow Rate	ASTM D1238	12.1 - 20.5	13.11	g/10 mins
Notch Impact	ASTM D256	min 294	429	J/M
Heat Deflection Temperature	ASTM D648	min 75	83	°C@1/4"
Specific Gravity	ASTM D792	min 1.15	1.17	

If you have any questions concerning this, please contact [CQC Online Administrator](#)

GE Plastics Singapore Pte Ltd
 3 Bencoolen Road
 Singapore 629695
 tel: (65) 6643273
 fax: (65) 6643267

As this is a computer generated form, no signature is required.



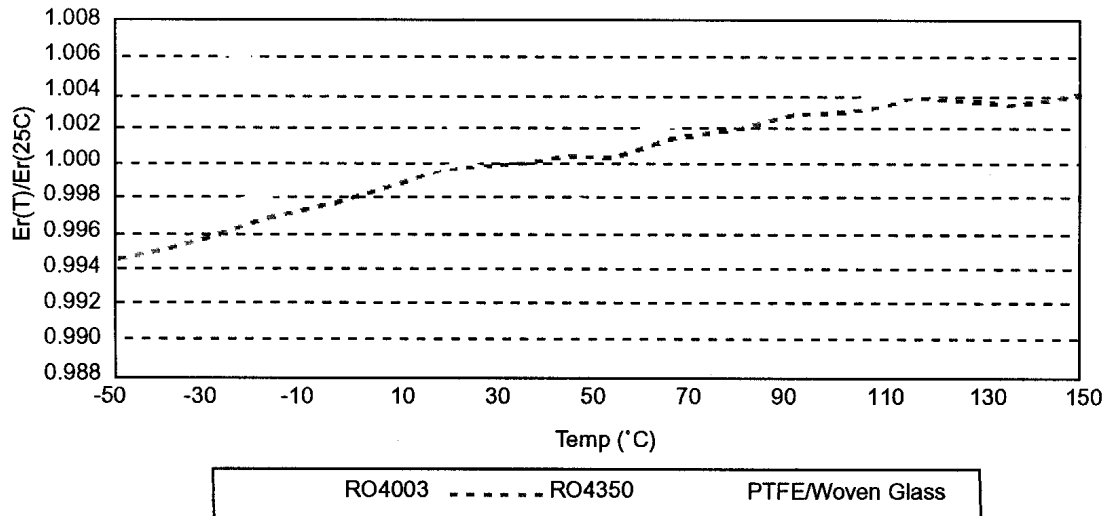
RO4000® Series Laminate Product Information:

PROPERTY	TYPICAL VALUES		DIRECTION	UNITS	CONDITION	TEST METHOD
	RO4003 ⁽¹⁾	RO4350B ⁽¹⁾				
Dielectric Constant ϵ_r	3.38 ± 0.05	3.48 ± 0.05	Z		10 GHz/23°C	IPC-TM-650 2.5.5.5
Dissipation Factor, tan (δ)	0.0027	0.0040	Z	-	10 GHz/23°C	IPC-TM-650 2.5.5.5
Thermal Coefficient of ϵ_r	+40	+50	Z	ppm/°C	-100°C to 250°C	IPC-TM-650 2.5.5.5
Volume Resistivity	1.7 x 10 ¹⁰	1.2 x 10 ¹⁰	-	M	COND A	IPC-TM-650 2.5.17.1
Surface Resistivity	4.2 x 10 ⁹	5.7 x 10 ⁹	-	M	COND A	IPC-TM-650 2.5.17.1
Electrical Strength	25.6 (650)	31.5 (800)	Z	KV/mm (V/mil)	0.51mm (0.020")	IPC-TM-650 2.5.6.2
Tensile Modulus	26,889 (3900)	11,473 (1664)	Y	MPa (kpsi)	RT	ASTM D638
Tensile Strength	141 (20.4)	175 (25.4)	Y	MPs (kpsi)	RT	ASTM D638
Flexural Strength	276 (40)	255 (37)	-	MPa (kpsi)	-	IPC-TM-650 2.4.4.
Dimensional Stability	<0.3	<0.5	X,Y	mm/m (mils/inch)	After etch +E2/150	IPC-TM-650 2.2.4
Coefficient of Thermal Expansion	11 14 46	14 16 50	X Y Z	ppm/°C	-55 to 288°C	IPC-TM-650 2.1.4.1
Tg	>280	>280	-	°C	2.4.24	TMA
Thermal Conductivity	0.64	0.62	-	W/m ² K	100°C	ASTM F433
Specific Gravity	1.79	1.86	-	-	23°C	ASTM D792
Water Absorption	0.04	0.02	-	%	48 hrs. immersion 0.060" sample Temperature 50°C	ASTM D570
Copper Peel Strength	1.05 (6.0)	0.88 (5.0)	-	N/mm (pli)	after solder float	IPC-TM-650 2.48
Flammability	N/A	UL 94V-0	-	-	-	

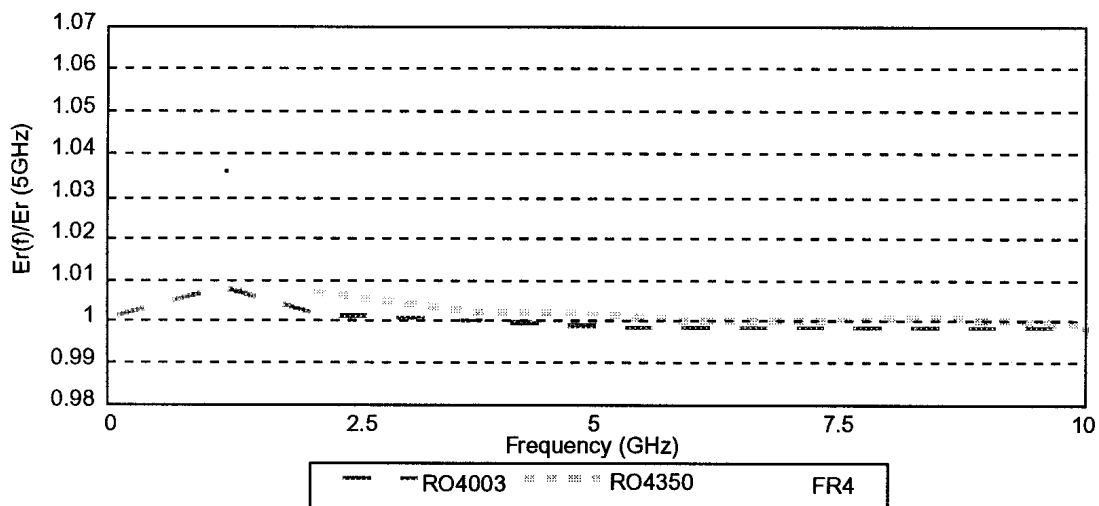
⁽¹⁾ Dielectric constant and loss tangent are reported based on IPC-TM-2.5.5.5 @ 10 GHz (stripline resonator). Departure from this test method or frequency may yield different values. It has been reported that in some microstrip applications, a Delta (Δ) of +0.2 in dielectric constant has been observed for both RO4003 and RO4350B based on actual circuit measurement and circuit modeling comparisons. It is up to the user to determine which value best fits the application and modeling software used during the design process while Rogers ensures the repeatability of the product received.



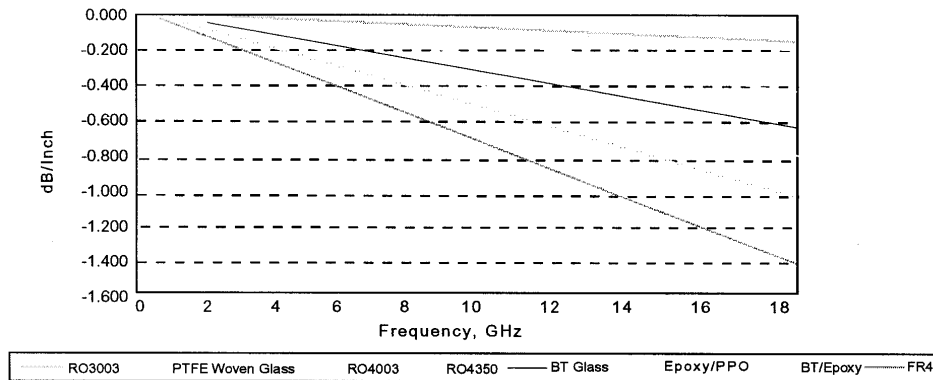
**Chart 1: RO4000 Series Materials
Dielectric Constant vs. Temperature**



**Chart 2: RO4000 Series Materials
Dielectric Constant vs. Frequency**



**Chart 3: Microstrip Insertion Loss
(0.030" Dielectric Thickness)**



Ordering Information:

Standard Thicknesses and Tolerances:

RO4003 Materials:

0.0080 ± 0.0010 (0.20 ± 0.03 mm)
 0.0200 ± 0.0015 (0.51 ± 0.04 mm)
 0.0320 ± 0.0020 (0.81 ± 0.05 mm)
 0.0600 ± 0.0040 (1.52 ± 0.10 mm)

RO4350 Materials:

0.0066 ± 0.0007 (0.17 ± 0.07 mm)
 0.0100 ± 0.0010 (0.25 ± 0.03 mm)
 0.0200 ± 0.0015 (0.51 ± 0.04 mm)
 0.0300 ± 0.0020 (0.76 ± 0.05 mm)
 0.0600 ± 0.0040 (1.52 ± 0.10 mm)

Standard Claddings:

½ ounce (17 µm) electrodeposited copper.
 1 ounce (35 µm) electrodeposited copper.

Standard Panels Sizes:

The standard panel sizes are 24" x 18" (610 x 457 mm) and 12" x 18" (305 x 457 mm).

Information on other thicknesses, claddings and panels sizes available call your Customer Service Representative at Tel: 480 961-1382 or Fax: 480 961-4533.

RO4003 and RO4350 are licensed trademarks of Rogers Corporation for its microwave laminate.

The above data represents typical values, not statistical minimums. It is not intended to and does not create any warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose. The relative merits of materials for a specific application should be determined by your evaluation.



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<http://www.rogers-corp.com/mwu/>

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 Rogers Southeast Asia, Sheung Wan, Hong Kong
 Tel: 852-2549-7806 Fax: 852-2549-8615
In Europe:
 Rogers N.V., Gent, Belgium
 Tel: 32-9-2353611 Fax: 32-9-2353658
In Taiwan:
 Rogers Taiwan Inc., Taipei, Taiwan R.O.C.
 Tel: 886-2-86609056 Fax: 886-2-86609057

ISO 9002 CERTIFIED

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