

承 認 書
SPECIFICATION FOR APPROVAL

客 戶
CUSTOMER

友旺科技股份有限公司

日 期
DATE

91 年 12 月 20 日

品 名
DESCRIPTION

SWIVEL TYPE , 5dBi DIPOLE ANTENNA
REVERSE SMA CONNECTOR

客 戶 料 號
CUSTOMER P/N



萬旭電業股份有限公司

WANSHIH ELECTRONIC CO., LTD.

台北縣五股鄉五工六路 72 號 3 樓

3F 72 WU KONG 6TH RD., WU KU INDUSTRIAL DISTRICT

TAIPEI HSIEN, TAIWAN, R.O.C.

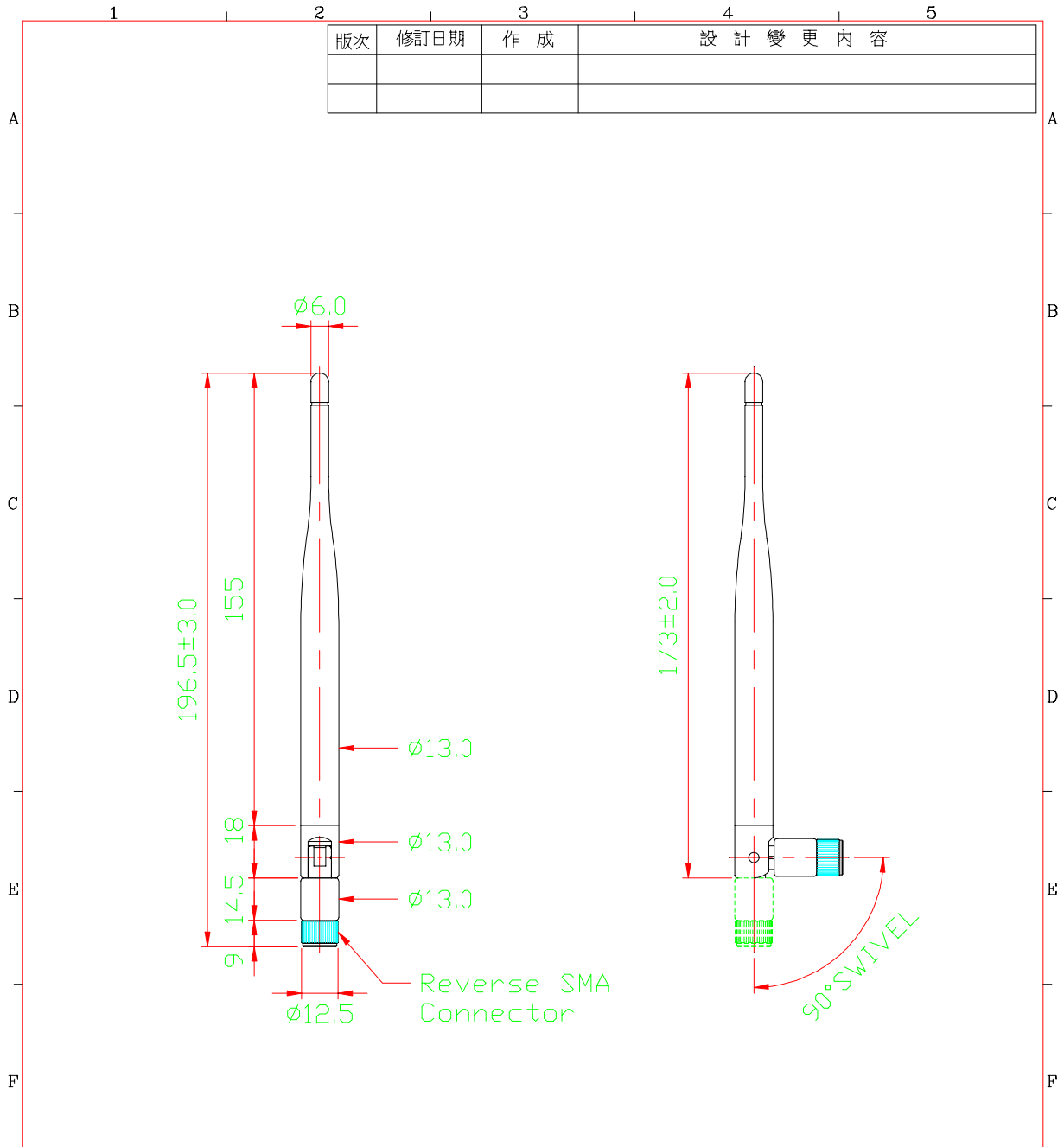
TEL : (02) 22988066 (5 LINE) FAX : (02)22981102

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SPECIFICATION

| | |
|---------------------------------|---------------------------------------|
| 1. DESCRIPTION | : 2.4Ghz Swivel Type , Dipole Antenna |
| 2. CUSTOMER | : 友旺科技股份有限公司 |
| 3. MODEL NO. | : SJW-0007A |
| 4. APPEARANCE | : See fig.1 |
| 5. FREQUENCY | : 2.4~2.5Ghz |
| 6. IMPEDANCE | : 50 Ohm nominal |
| 7. S.W.R. | : Less than 2.0:1 |
| 8. GAIN | : 5dBi |
| 9. ADMITTED POWER RADIATION | : 1W |
| 10. TYPE OF RADITION. | : Toroidal |
| 11. POLARIZATION | : Vertical |
| 12. ELECTRICAL LENGTH | : Dipole |
| 13. CONNECTOR | : SMA reverse connector |
| 14. OPERATION TEMPERATURE RANGE | : -20 ~+65 |
| 15. STORAGE TEMPERATURE | : -30 ~+75 |



| 版次 | 修訂日期 | 作成 | 設計變更內容 |
|----|------|----|--------|
| | | | |
| | | | |

TOLERANCES:

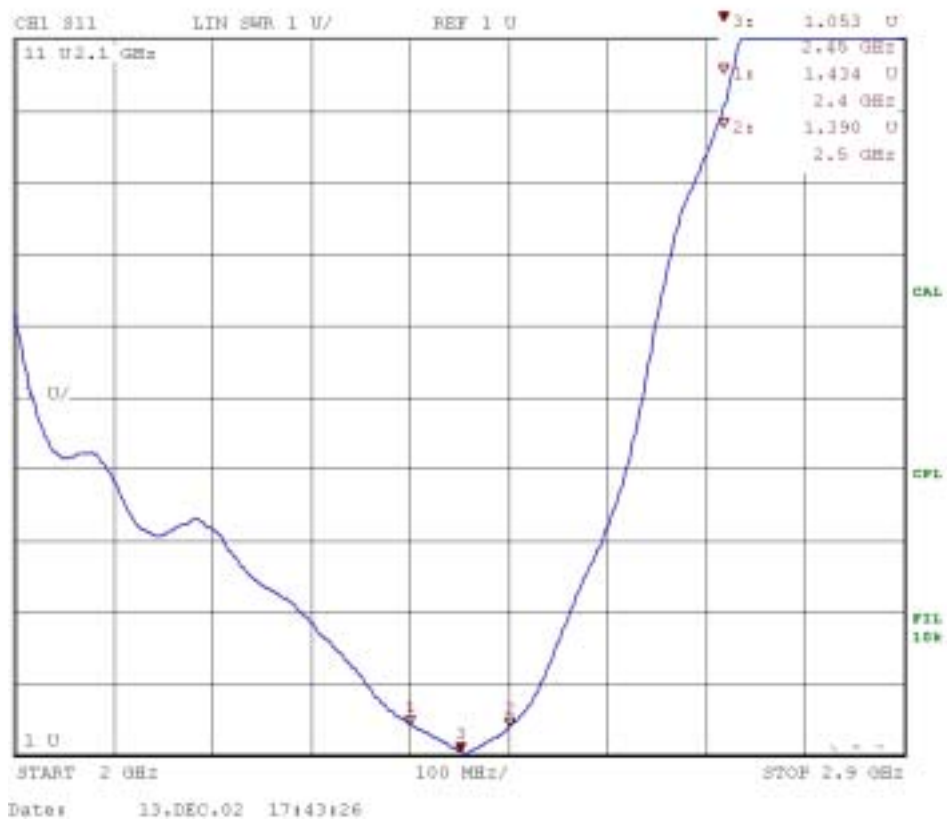
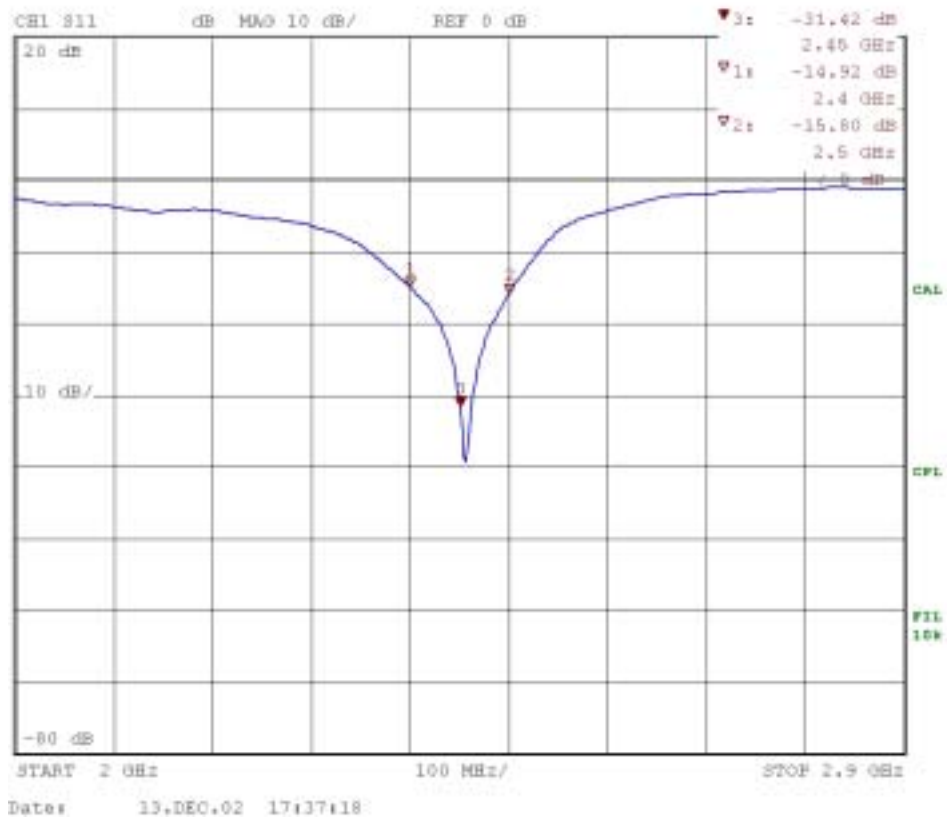
| | |
|---------|--------|
| X | ± 0.5 |
| X.X | ± 0.2 |
| X.XX | ± 0.1 |
| ANGULAR | ± 5.0° |

| 項次 | 品名 | 材質 | 處理 |
|----|-----------|---------|-----|
| 1 | Connector | BRASS | 鍍黑鉻 |
| 2 | HINGE | PC | 黑色 |
| 3 | 套管 | TPUS95A | 黑色 |

| | | | | | | | |
|----------|----|-----|----|------|---------------------------------|----------|--------------|
| 第三角法 | 品管 | 技術課 | | 承認圖號 | | | |
| 單位：mm | 確認 | 審核 | 作成 | 品名 | SWIVEL TYPE 5dBi DIPOLE ANTENNA | | |
| 比例：1/2 | | | | 成品編號 | SJW-0007A | REV A | VERSION 1 |
| 日期：12/13 | | | | | | | |
| 樣單： | | | | | | | |

萬旭電業股份有限公司

文件編號：FMT-0513-A1



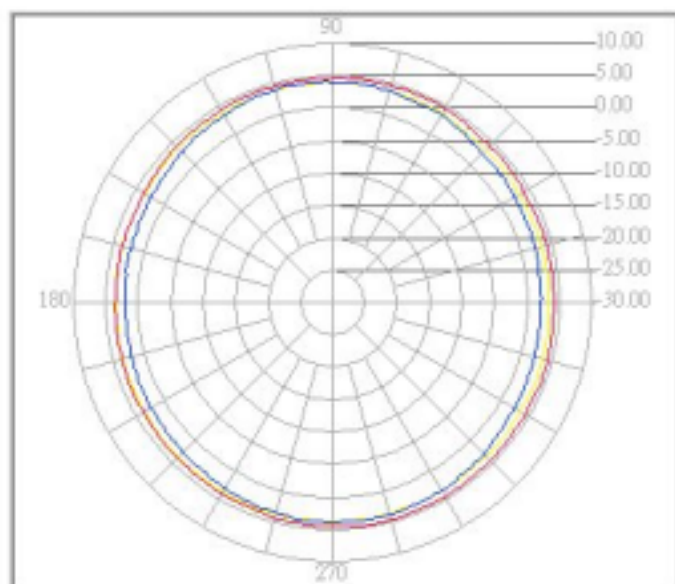


萬旭電業股份有限公司

Model No: 5dBi-01

Antenna Position: Vertical

Test Mode: 5dBi



| Freq(MHz) | Avg(dBi) |
|-----------|----------|
| 2400.00 | 3.62 |
| peak(dBi) | Angle(o) |
| 4.03 | 97.76 |

| Freq(MHz) | Avg(dBi) |
|-----------|----------|
| 2450.00 | 4.23 |
| peak(dBi) | Angle(o) |
| 4.78 | 279.49 |

| Freq(MHz) | Avg(dBi) |
|-----------|----------|
| 2500.00 | 2.97 |
| peak(dBi) | Angle(o) |
| 4.13 | 92.01 |

Test engineer: David Hsu

Test date: 2002/10/23 at 上午 10:56

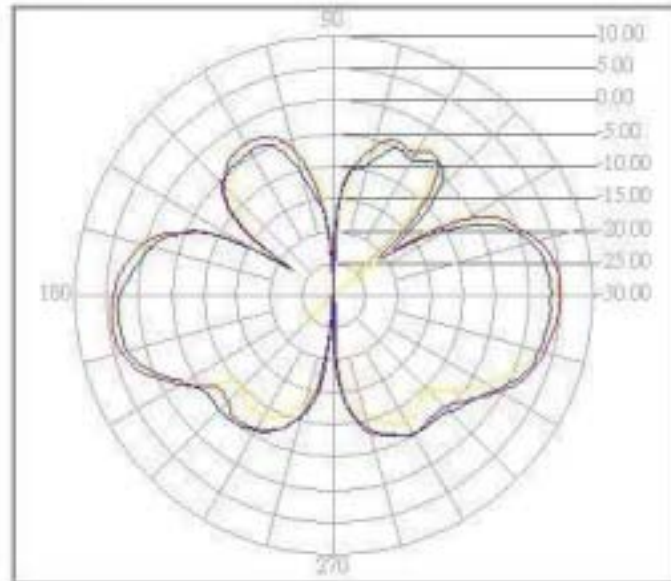


萬旭電業股份有限公司

Model No: 5dBi-01

Antenna Position: Horizontal

Test Mode: 5dBi



| Freq (MHz) | Avg (dBi) |
|------------|-----------|
| 2400.00 | -6.84 |
| peak (dBi) | Angle (o) |
| 3.92 | 358.85 |
| Freq (MHz) | Avg (dBi) |
| 2450.00 | -5.47 |
| peak (dBi) | Angle (o) |
| 4.98 | 3.45 |
| Freq (MHz) | Avg (dBi) |
| 2500.00 | -5.91 |
| peak (dBi) | Angle (o) |
| 3.62 | 356.55 |

Test engineer: David Kell

Test date: 2002/10/23 at 上午 10:50








樣品承認書

附表二

徐素君

編號：M30-068++-000

| | | |
|---|---|---------|
| 品名 / 型號： C068-510195-A 2.4G SMA ANTENNA | | |
| 料 號：M30-068++-000  | | |
| 申請日期：91/10/28 | 申請部門：Gateway System | |
| 製造(代理)商：譚裕 | 主管：  | 申請人：陳志偉 |
| 適用機種、PC 板名：WR104K | | |
| 規格(材質、尺寸、公差、圖面...)： 如附件 | | |
| <input type="checkbox"/> 客戶之環保要求 <input checked="" type="checkbox"/> NA <input type="checkbox"/> 其它 _____ | | |
| 樣品產生來源：1. <input checked="" type="checkbox"/> 研發階段 2. <input type="checkbox"/> 設計變更 3. <input type="checkbox"/> Second Source 4. <input type="checkbox"/> 已量產，補確認 5. <input type="checkbox"/> _____ | | |
| 測試結果： | | |
| <input checked="" type="checkbox"/> 電子： Test OK ! | 測試人：陳志偉 | |
| <input type="checkbox"/> 機 構： | 測試人： | |
| <input type="checkbox"/> 電 源： | 測試人： | |
| <input type="checkbox"/> 軟 體： | 測試人： | |
| <input type="checkbox"/> 其 他： | 測試人： | |
| 關鍵特性： N/A | | |
|  | | |
| 核准：  | 承辦：  | |

QP-005-02E


保存期限：

零組件承認申請單


附表一




承認書編號：M30-068++-000

| | |
|--------------|--|
| 品名 | C068-510195-A 2.4G SMA ANTENNA |
| 料號 | M30-068 ++-000  |
| 檢驗依據 | <input checked="" type="checkbox"/> 圖面【 】 <input type="checkbox"/> 樣品 <input type="checkbox"/> 其他【 】 |
| 供應廠商 | <input checked="" type="checkbox"/> 製造商 <input type="checkbox"/> 代理商 廠商名稱 謙裕 |
| 樣品來源 | <input checked="" type="checkbox"/> 研發階段 <input type="checkbox"/> 設計變更 <input type="checkbox"/> 第二來源 <input type="checkbox"/> 補確認 (已量產) <input type="checkbox"/> _____ |
| 備註欄： | TEST OK ! |
| | <input type="checkbox"/> 客戶之環保要求 <input checked="" type="checkbox"/> NA <input type="checkbox"/> 其它 _____ |
| 注意事項 (關鍵特性)： | N/A |



核准：
/ /

製表：

91/10/28 QP-005-
保存期限：1年



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

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

SPECIFICATION FOR APPROVAL

M30-068++-000

CUSTOMER: 友旺科技股份有限公司

PART NAME: RF Antenna Cable Assembly

PART NO: **REVISION:**

W. Y. P/NO.: C068-510195-A **REV.:** X1

| | MANUFACTURER SIGNATURE | CUSTOMER SIGNATURE |
|----------------------|------------------------|--------------------|
| APPROVED BY : | | 陳志偉 |
| DATE : | 91.10.28 | 91.10.28 |

WHA YU GROUP

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Fax: + 886-3-5713853 • + 886-3-5723600

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Fax: + 86-769-5599376

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上海華裕電子有限公司

Address: Lian Ho Village, Bai Ho Town, Qing

Pu Country Shanghai, China

Tel: + 86-21-59741348 • + 86-21-59743624

Fax: + 86-21-59741347



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RF Antenna Cable Assembly

Specification

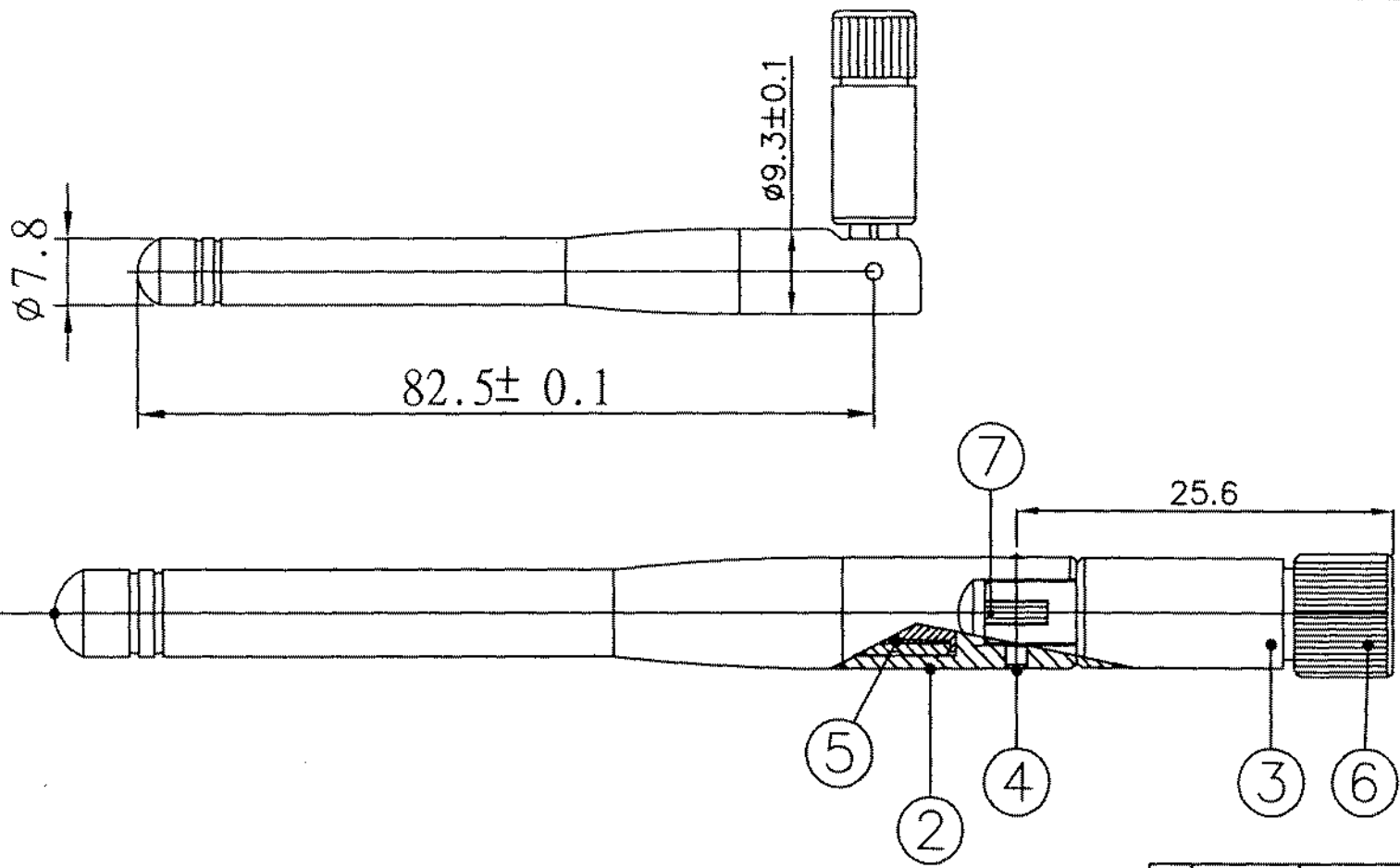
1. Electrical Properties :

- 1.1 Frequency Rang..... 2.4GHz ~ 2.5GHz
- 1.2 Impedance 50 Ω Nominal
- 1.3 VSWR2.0 Max.
- 1.4 Return Loss..... -9.5 dB Maximum
- 1.5 Electrical Wave..... $1/2 \lambda$ Diople
- 1.6 Gain..... 1.8 dBi
- 1.7 Admitted Power..... 1W

2. Physical Properties :


- 2.1 Connector..... SMA Straight Plug/Reverse
- 2.2 Cable..... RG-178 50 Ω
- 2.3 Antenna Cover..... TPE
- 2.4 Antenna Base..... PC
- 2.5 Operating Temp.-20 $^{\circ}$ C ~ +65 $^{\circ}$ C
- 2.6 Storage Temp.-30 $^{\circ}$ C ~ +75 $^{\circ}$ C
- 2.7 ColorBlack

| REV | DATE | DESCRIPTION |
|-----|------------|------------------------|
| X1 | 10/28-2002 | Initial Sample Request |



| NO | DESCRIPTION | QTY | REMARK |
|----|---------------|---------------------------------|--------|
| 7 | Cable | RG-178, Translucent Brown; 50 Ω | 1 |
| 6 | Connector | SMA Straight Plug/Reverse | 1 |
| 5 | Ground Tube | Brass, Ni plated | 1 |
| 4 | Rivet | Brass, Black Surfaced | 2 |
| 3 | Antenna Base | PC; Color:Black | 1 |
| 2 | Antenna Base | PC; Color:Black | 1 |
| 1 | Antenna Cover | TPE; Color:Black | 1 |

| | | | | |
|----------------------|-------------|----------|----------------------|-------------------------------------|
| CUSTOMER'S SIGNATURE | XX ±5 | APPROVED | CUSTOMER: 友旺科技股份有限公司 | |
| | X ±1.0 | CHECKED | | PART NO : |
| | .X ±0.1 | | | PARTNAME: RF Antenna Cable Assembly |
| | .XX ±0.01 | | | W.Y P/NO : C068-510195-A |
| | .XXX ±0.005 | DRAWING | | REV UNIT FILE : |
| | | 粘明鴻 | X1 m/m SHEET : 1/1 | |



Wha Yu
INDUSTRIAL CO.,LTD.

誨裕實業股份有限公司

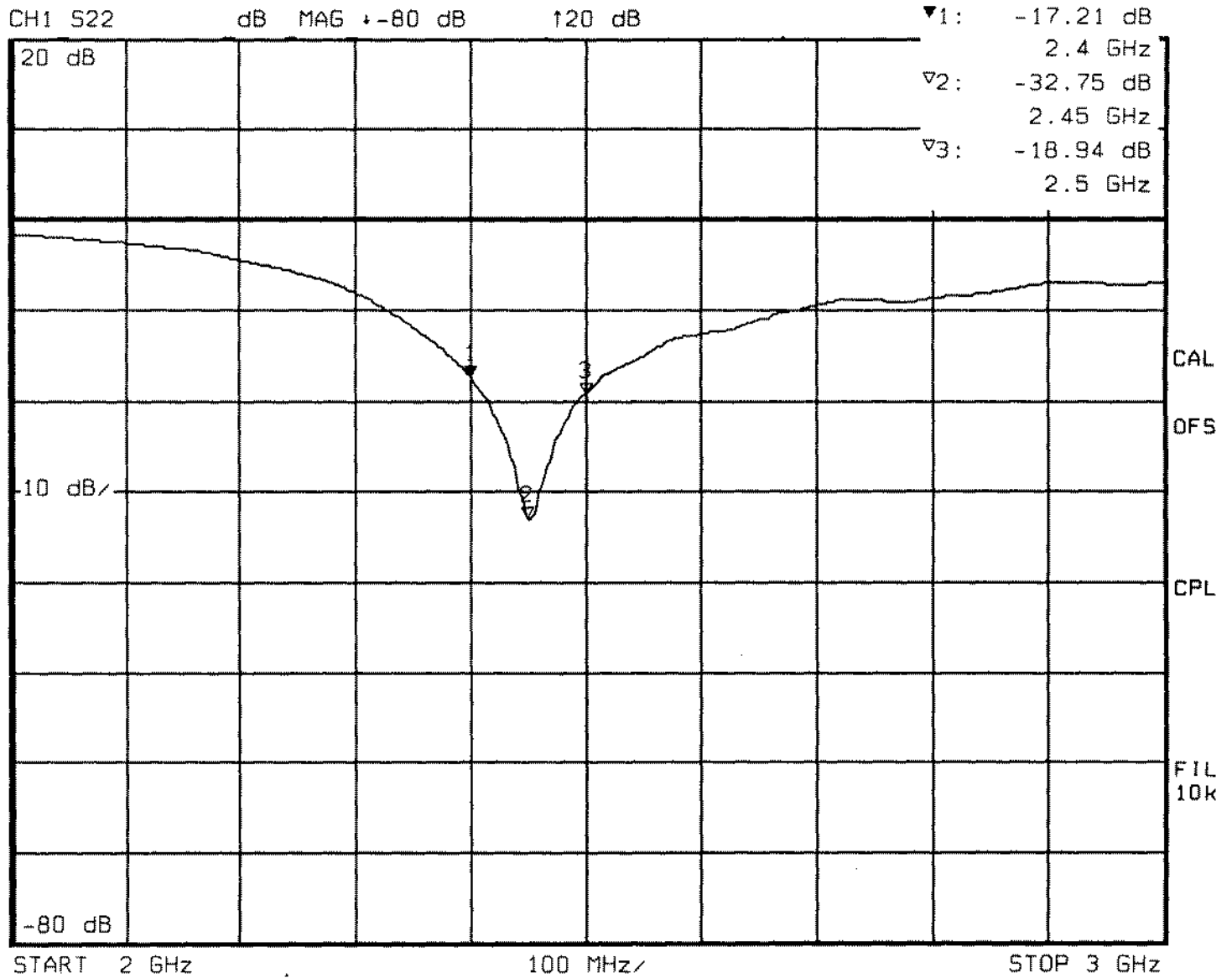
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譚裕實業股份有限公司
WHA YU INDUSTRIAL CO., LTD

RF Antenna Cable Assembly

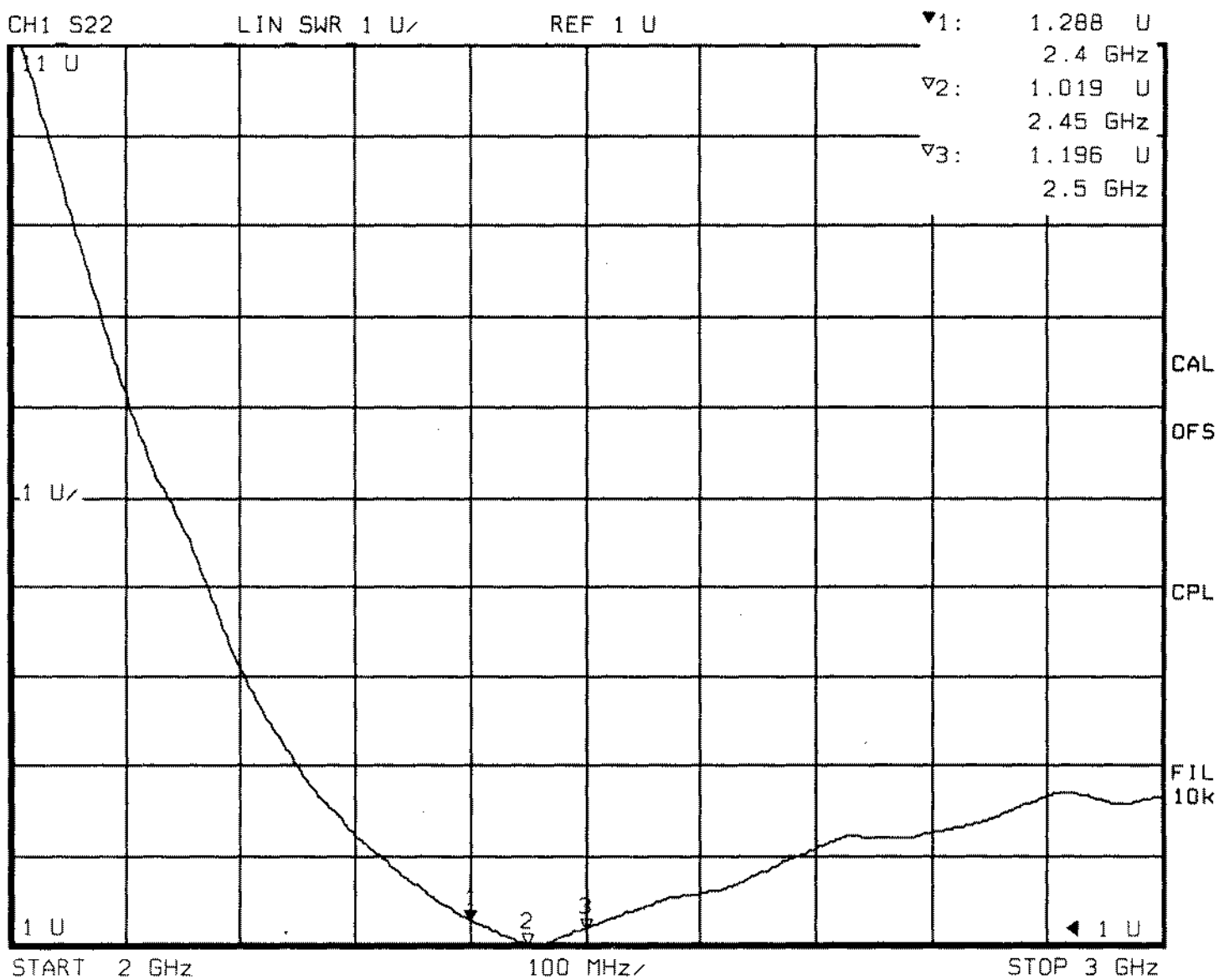
Return Loss



Date: 28.OCT.02 10:24:23

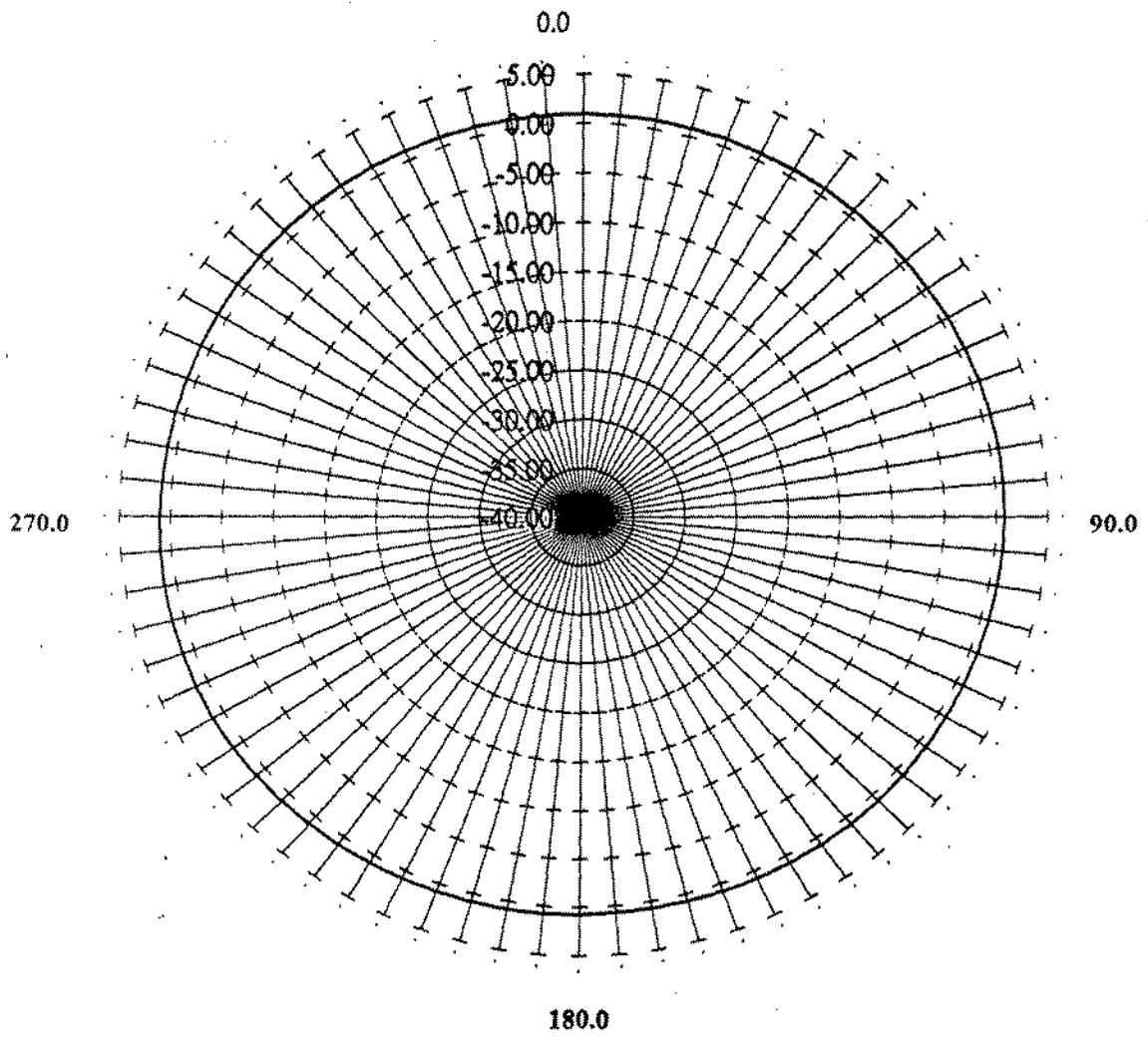
RF Antenna Cable Assembly

VSWR

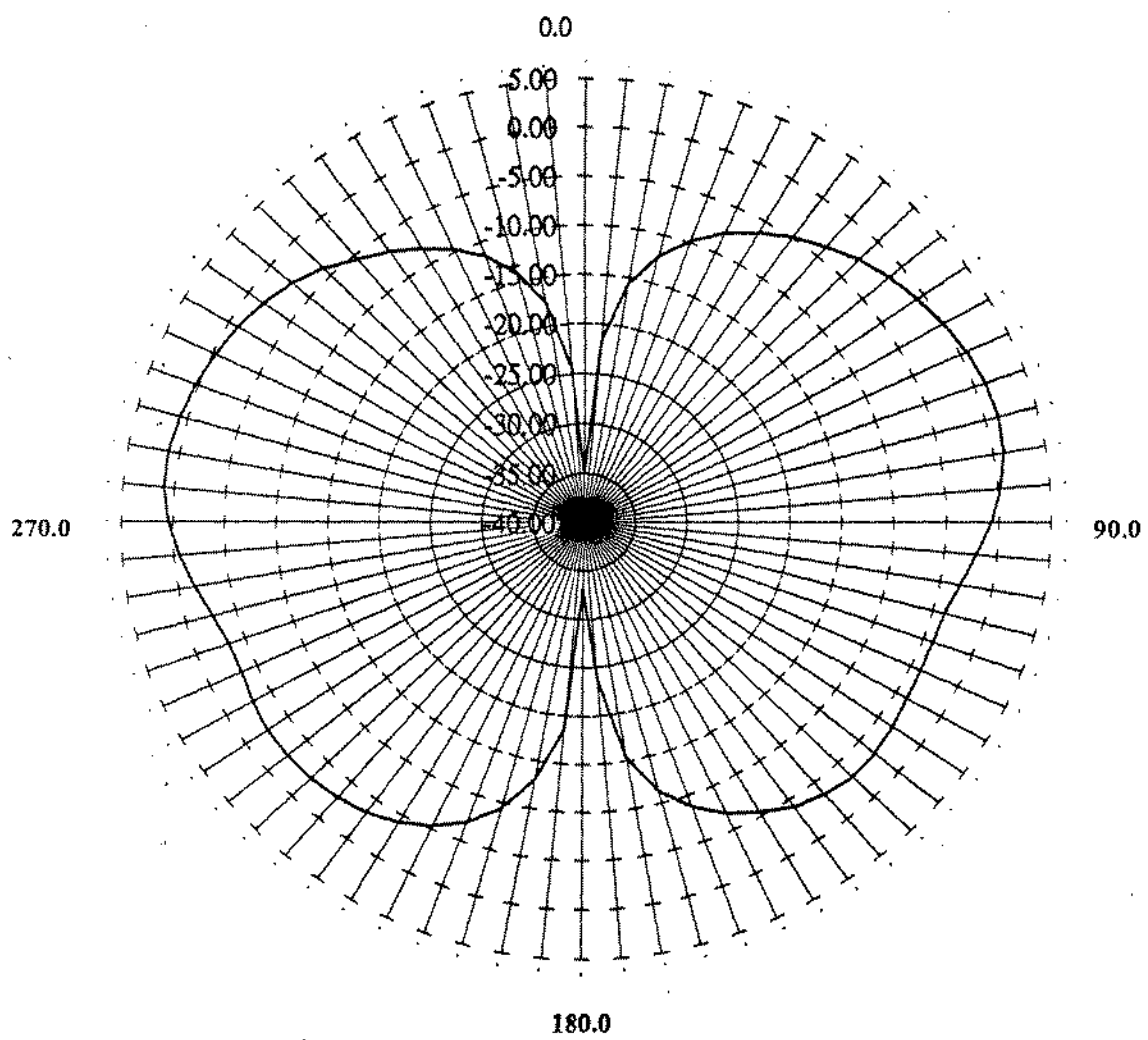


Date: 28.OCT.02 10:24:51

H_PLANE



E_PLANE



Cable Specification

Cable : Mil-C-17 Coaxial Cable RG-178

1. Construction :

- 1 Conductor..... 30AWG 7/38 SCCS
- 2 Dielectric..... PTFE OD : 0.033"±0.002"
- 3 Shielded..... 38AWG SPC OD : 0.051" Nominal
- 4 Jacket..... FEP OD : 0.071"±0.004"

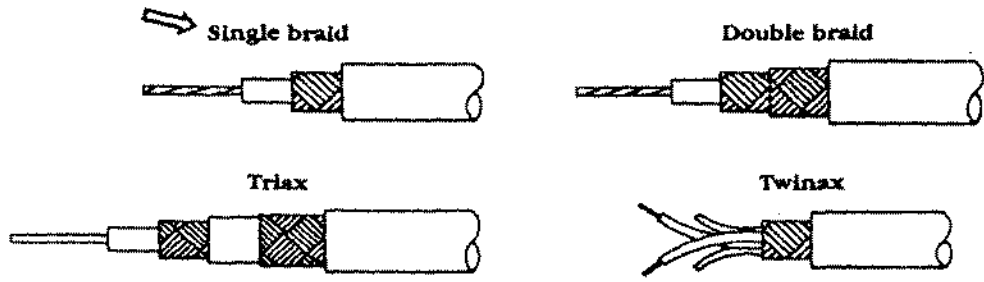
2. Physical Properties :

- 1 Weight per 1000ft..... 6.3 lbs Maximum
- 2 Bend Radius..... 0.35" Minimum
- 3 Operating Temperature Range -55°C ~ 200°C

3. Electrical Properties:

- 1 Impedance..... 50±2 ohms
- 2 Capacitance..... 32 pF/ft Maximum
- 3 Cut off Frequency..... 116 GHz
- 4 Attenuation..... 45.0 dB/100ft @ 1GHz
64.4 dB/100ft @ 2GHz
79.7 dB/100ft @ 3GHz
92.7 dB/100ft @ 4GHz
104.3 dB/100ft @ 5GHz
115.0 dB/100ft @ 6GHz

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.

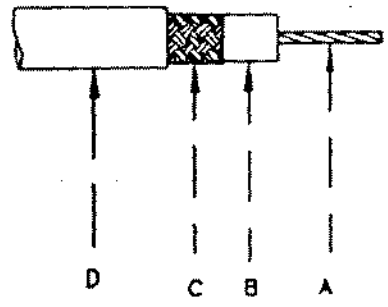
UL Approvals

All of Harbour's M17 part numbers manufactured to the MIL-C-17 specification may be ordered with UL 1971 and FT4/PT6 approvals.



c:\data\drawing\black

| Rev | Change | Date |
|-----|--------|------|
| | | |
| | | |



Construction:

- A) Center Conductor:
30 7/38 SPCW
OD .012" ± .001"
- B) Dielectric:
Extruded PTFE
OD .033" ± .002"
- C) Shield:
38 AWG SPC
OD .051" Nom.
- D) Jacket:
FEP - Brown Tint
OD .071" ± .004"
Surface Printed: "RG178HF HARBOUR INDUSTRIES 27478"

Electricals:

- Impedance: 50 ± 2 Ohms
- Capacitance: 32 pF/ft Max.
- Velocity of Prop.: 70% Norm.
- Cut off Frequency: 116 GHz

Physical Properties:

- Weight per 1000 ft: 6.3 lbs Max.
- Minimum Bend Radius: .35"
- Operating Temperature Range: -55°C to 200°C

Attenuation:

| | |
|---------|-----------------|
| 1.0 GHz | 45.0 dB/100ft. |
| 2.0 GHz | 64.4 dB/100ft. |
| 3.0 GHz | 79.7 dB/100ft. |
| 4.0 GHz | 92.7 dB/100ft. |
| 5.0 GHz | 104.3 dB/100ft. |
| 6.0 GHz | 115.0 dB/100ft. |

| Harbour Industries | | | |
|--------------------------|----------------|-----------------------------|--------------|
| Date: 12/17/01 | Scale: None | Drawn By: MTPiner | |
| Drawing Name: RG178HF | | Rev: | Sheet 1 of 1 |
| Part Number: TBD | | Drawing Number: 121701_1 | |

MIL-C-17 Type Coaxial Cable, QPL approved

Physical Characteristics

| M17 Number | Center Conductor | Dielectric | | | Shield | Jacket | Overall O.D. | Operating Temp °C | Weight (lbs./MFT) | Comments |
|---------------|--------------------------|------------|--------|--------|--------|--------|--------------|-------------------|-----------------------|----------|
| | | Dielectric | O.D. | | | | | | | |
| M17/60-RG142 | .037 " SCCS | PTFE | .116 " | SPC(2) | FEP | .195 " | -55+200 | 43.0 | | |
| M17/93-RG178 | .0120 " (71.004 ") SCCS | PTFE | .033 " | SPC | FEP | .071 " | -55+200 | 6.3 | | |
| M17/94-RG179 | .0120 " (71.004 ") SCCS | PTFE | .063 " | SPC | FEP | .100 " | -55+200 | 10.8 | | |
| M17/110-RG302 | .0253 " SCCS | PTFE | .146 " | SPC | FEP | .202 " | -55+200 | 40.0 | | |
| M17/111-RG303 | .037 " SCCS | PTFE | .116 " | SPC | FEP | .170 " | -55+200 | 31.0 | | |
| M17/112-RG304 | .059 " SCCS | PTFE | .185 " | SPC(2) | FEP | .280 " | -55+200 | 94.0 | QPL Approval Pending | |
| M17/113-RG316 | .0201 " (71.0067 ") SCCS | PTFE | .060 " | SPC | FEP | .098 " | -55+200 | 12.2 | | |
| M17/127-RG393 | .094 " (71.0312 ") SPC | PTFE | .285 " | SPC(2) | FEP | .390 " | -55+200 | 165.0 | | |
| M17/128-RG400 | .0384 " (19/.008 ") SPC | PTFE | .116 " | SPC(2) | FEP | .195 " | -55+200 | 50.0 | | |
| M17/131-RG403 | .0120 " (71.004 ") SCCS | PTFE | .033 " | SPC(2) | FEP(2) | .116 " | -55+200 | 15.0 | Triaxial M17/93-RG178 | |
| M17/152-00001 | .0201 " (71.0067 ") SCCS | PTFE | .060 " | SPC(2) | FEP | .114 " | -55+200 | 18.5 | Double Shielded RG316 | |

RG Type Coaxial Cable, Non-QPL

| | | | | | | | | | |
|-------------|-------------------------|------------|--------|--------|-----|--------|---------|-------|------------------------|
| RG174 /U | .0120 " (71.0067 ") TPC | PE | .060 " | TPC | PVC | .110 " | -40+ 85 | 9.0 | |
| RG213 /U | .089 " (71.0296 ") BC | PE | .285 " | BC | PVC | .405 " | -40+ 80 | 111.0 | |
| RG214 /U | .089 " (71.0296 ") SPC | PE | .285 " | SPC(2) | PVC | .425 " | -40+ 80 | 136.4 | |
| RG223 /U | .034 " SPC | PE | .117 " | SPC(2) | PVC | .212 " | -40+ 80 | 36.7 | |
| RG178 /U-SF | .0120 " (71.004 ") TPC | PE irradi. | .033 " | TPC | PVC | .071 " | -40+105 | 5.8 | Flexible, 105°C. rated |
| RG178 /U | .0120 " (71.004 ") SPC | FEP | .033 " | SPC | FEP | .071 " | -55+200 | 6.3 | |
| RG179 B/U | .0120 " (71.004 ") SPC | FEP | .063 " | SPC | FEP | .100 " | -55+200 | 10.8 | |
| RG316 /U | .0201 " (71.0067 ") SPC | FEP | .060 " | SPC | FEP | .098 " | -55+200 | 12.2 | |
| RG142 B/U | .037 " SPC | FEP | .116 " | SPC(2) | FEP | .195 " | -55+200 | 43.0 | |
| RG400 /U | .0384 " (19/.008 ") SPC | FEP | .116 " | SPC(2) | FEP | .195 " | -55+200 | 50.0 | |

Other type RG cables are available upon requested.

PTFE Tape Wrap Jacketed RG Cables:

| | | | | | | | | | |
|-----------|--------------------------|------|--------|-----|------|--------|---------|------|------------------------|
| RG187 A/U | .0120 " (71.004 ") SCCS | PTFE | .063 " | SPC | PTFE | .100 " | -55+250 | 9.0 | Flexible, 250°C. rated |
| RG188 A/U | .0201 " (71.0067 ") SCCS | PTFE | .060 " | SPC | PTFE | .100 " | -55+250 | 12.0 | Flexible, 250°C. rated |
| RG196 A/U | .0120 " (71.004 ") SCCS | PTFE | .034 " | SPC | PTFE | .080 " | -55+250 | 8.0 | Flexible, 250°C. rated |

Electrical Characteristics

| Type No. | Impedance (ohms) | Capaci. (pf/ft) | Working Voltage (Volts RMS) | Maximum Attenuation (db/100ft) @ | | | | | | Max Frequency (Ghz) |
|---------------|------------------|-----------------|-----------------------------|----------------------------------|--------|-------|------|-------|-------|---------------------|
| | | | | 100Mhz | 400Mhz | 1 Ghz | 3Ghz | 5Ghz | 10Ghz | |
| M17/60-RG142 | 50 +/- 2 | 29.4 | 1900 | 5.5 | 11.7 | 19.0 | 35.0 | 48.0 | - | 12.4 |
| M17/93-RG178 | 50 +/- 2 | 29.4 | 1000 | 16.0 | 33.0 | 52.0 | 94.0 | - | - | 3.0 |
| M17/94-RG179 | 75 +/- 3 | 19.4 | 1000 | - | 21.0 | - | - | - | - | - |
| M17/110-RG302 | 75 +/- 3 | 19.4 | 2300 | - | 8.0 | - | 26.0 | - | - | - |
| M17/111-RG303 | 50 +/- 2 | 29.4 | 1900 | 3.9 | 8.6 | 15.0 | 28.0 | - | - | - |
| M17/112-RG304 | 50 +/- 2 | 29.4 | 3000 | 2.7 | 6.4 | 11.1 | 22.0 | 30.0 | 37.0 | 8.0 |
| M17/113-RG316 | 50 +/- 2 | 29.4 | 1200 | 11.0 | 21.0 | 38.0 | 58.0 | - | - | 3.0 |
| M17/127-RG393 | 50 +/- 2 | 29.4 | 2500 | 2.4 | 5.0 | 8.8 | 18.0 | 24.6 | 37.0 | 11.0 |
| M17/128-RG400 | 50 +/- 2 | 29.4 | 1900 | 4.5 | 10.5 | 17.0 | 38.0 | 50.0 | 78.0 | 12.0 |
| M17/131-RG403 | 50 +/- 2 | 29.4 | 1000 | - | 37.0 | - | - | - | - | 10.0 |
| M17/152-00001 | 50 +/- 2 | 29.4 | 1200 | 11.5 | 24.0 | 40.0 | 75.0 | 110.0 | 170.0 | 12.0 |
| RG174 /U | 50 +/- 2 | 30.8 | 1200 | 11.0 | 21.0 | 38.0 | 58.0 | - | - | 3.0 |
| RG213 /U | 50 +/- 2 | 30.8 | 2500 | 2.1 | 5.0 | 8.8 | 18.0 | - | - | - |
| RG214 /U | 50 +/- 2 | 30.8 | 2500 | 2.1 | 5.0 | 8.8 | 16.0 | - | - | - |
| RG223 /U | 50 +/- 2 | 30.8 | 1900 | 4.9 | 11.0 | 18.0 | 39.5 | - | - | - |
| RG178 /U-SF | 50 +/- 2 | 30.8 | 1000 | 16.0 | 33.0 | 52.0 | 94.0 | - | - | 3.0 |
| RG178 /U | 50 +/- 2 | 29.4 | 1000 | 16.0 | 33.0 | 52.0 | 94.0 | - | - | 3.0 |
| RG179 B/U | 75 +/- 3 | 19.4 | 1000 | - | 21.0 | - | - | - | - | - |
| RG316 /U | 50 +/- 2 | 29.4 | 1200 | 11.0 | 21.0 | 38.0 | 58.0 | - | - | 3.0 |
| RG142 B/U | 50 +/- 2 | 29.4 | 1900 | 5.5 | 11.7 | 19.0 | 35.0 | - | - | - |
| RG400 /U | 50 +/- 2 | 29.4 | 1900 | 4.5 | 10.5 | 17.0 | 38.0 | - | - | - |

PTFE Tape Wrap Jacketed RG Cables:

| | | | | | | | | | | |
|-----------|----------|------|------|------|------|------|------|---|---|-----|
| RG187 A/U | 75 +/- 3 | 19.4 | 1200 | - | 21.0 | - | - | - | - | 3.0 |
| RG188 A/U | 50 +/- 2 | 29.4 | 1200 | 11.0 | 21.0 | 38.0 | 58.0 | - | - | 3.0 |
| RG196 A/U | 50 +/- 2 | 29.4 | 1000 | - | 29.0 | - | - | - | - | - |

All figures referenced above are nominal unless otherwise specified.

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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 |
| °C | 195 | 185 | 202 | 212 | 221 | 197 |
| μ m/m.k | 220 | 160 | 180 | 140 | 110 | 150 |
| °C | \ | \ | 110 | 115 | 120 | \ |
| °C | 130 | 150 | 180 | 200 | 200 | 145 |
| °C | \ | 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/m' | NB | NB | NB | NB | NB | NB |
| kJ/m' | NB | NB | NB | NB | 200 | NB |
| kJ/m' | NB | NB | NB | NB | 9 | NB |
| kJ/m' | 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 |

Arnitel

2.2 Product coding

The structure of the Arnitel productcodes is illustrated with 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, performance

- 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 | EL630 | EL740 |
| | | | | EM550 | EM630 | EM740 |
| Arnitel P | PL380 | | PL460 | PL580 | | |
| | | | | PM581 | | |
| Arnitel U | | | | UM551 | UM622 | |
| | | | | UM551-V | | |
| | | | | UM552 | | |
| | | | | UM552-V | | |

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.

| | Arnitel E | Arnitel P | Arnitel U |
|-------------------|-------------------------|------------------|------------------|
| Automotive | | | |
| • CVJ boots | EB460 EB463 EB464 | | |
| • Boyplugs | | PL380-M0 | |
| Extrusion | | | |
| • Roofing foil | EM402-L | | |

Table 2.3: Examples of specialty grades

Amitel® EL630/EM630

2.8.31 General:

Amitel 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. Amitel EL630 and EM630 are excellent materials for injection moulding and extrusion applications respectively. The chemical structure of Amitel EL630/EM630 is shown below.

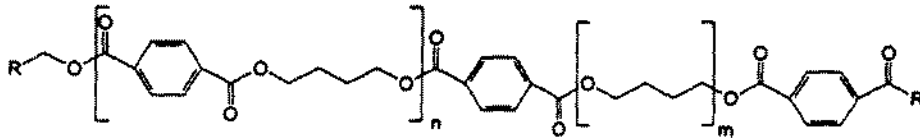


Figure 2.9: Chemical structure of Amitel EL630/EM630.

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



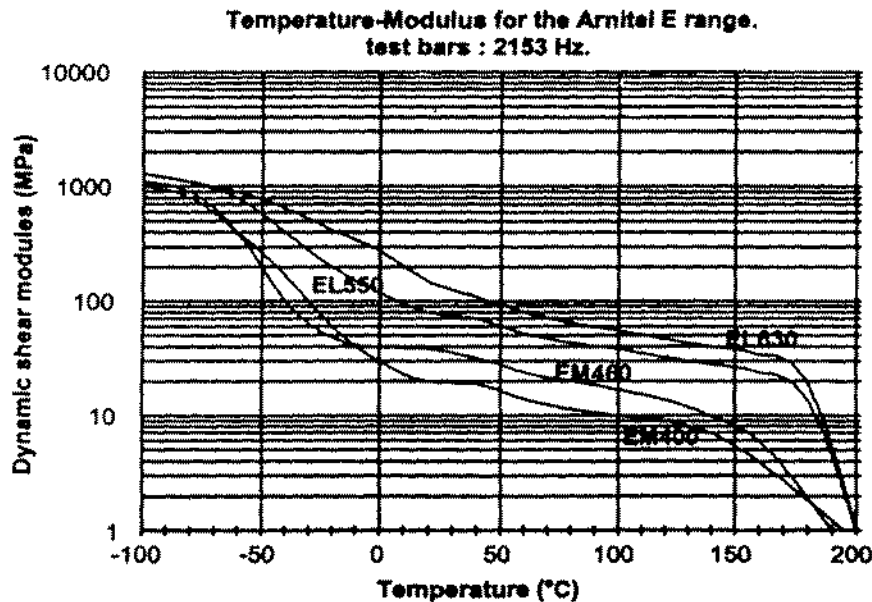
Figure 2.10: Simplified structure of Amitel EL630/EM630.

Amitel 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 Amitel E types.



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

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

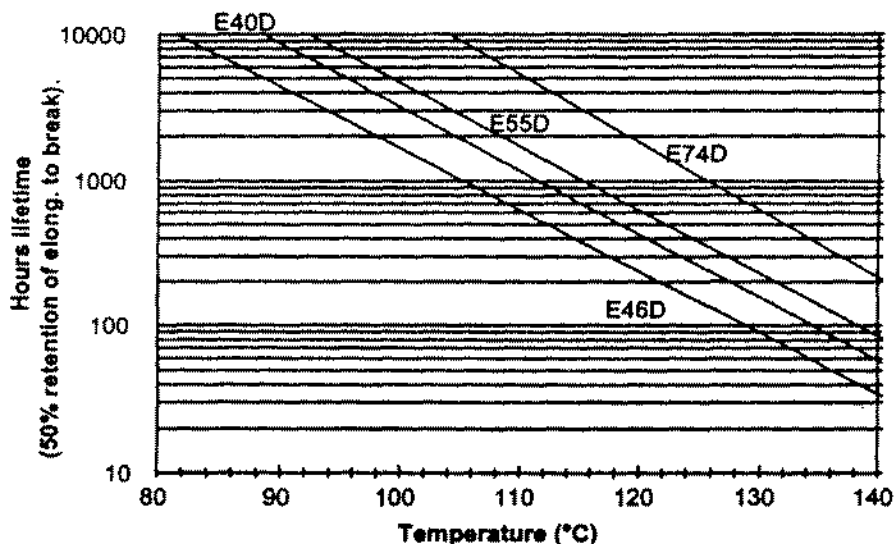
Arnitel EL630 and EM630 have a melting point of 213°C as found in the second heating curve of a DSC. The polymer will crystallize at 155°C using a 20°C/min cooling rate. The thermal expansion coefficient of Arnitel EL630/EM630 and is $140 \cdot 10^{-4} \mu\text{m/m.K}$.

• **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/cm³ 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.

Arnitel® EL630/EM630

• **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 |

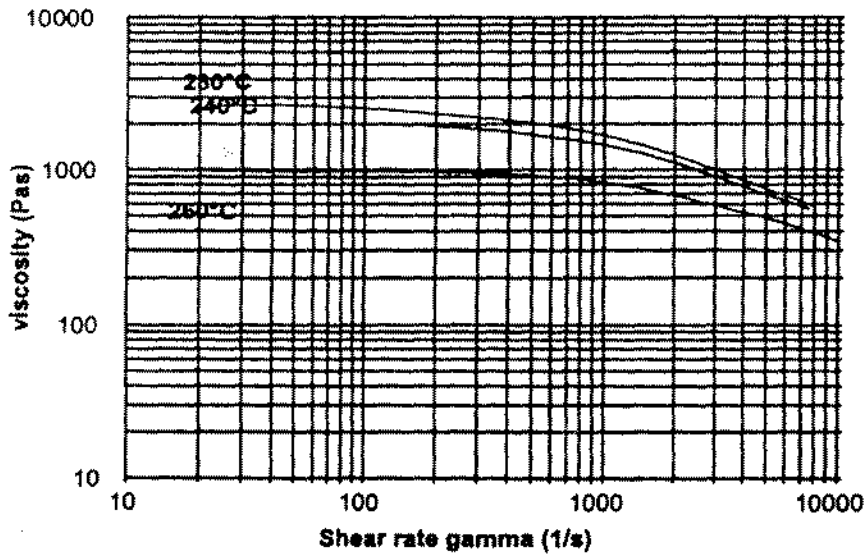
All temperatures are in °C.

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

• **Rheology:**

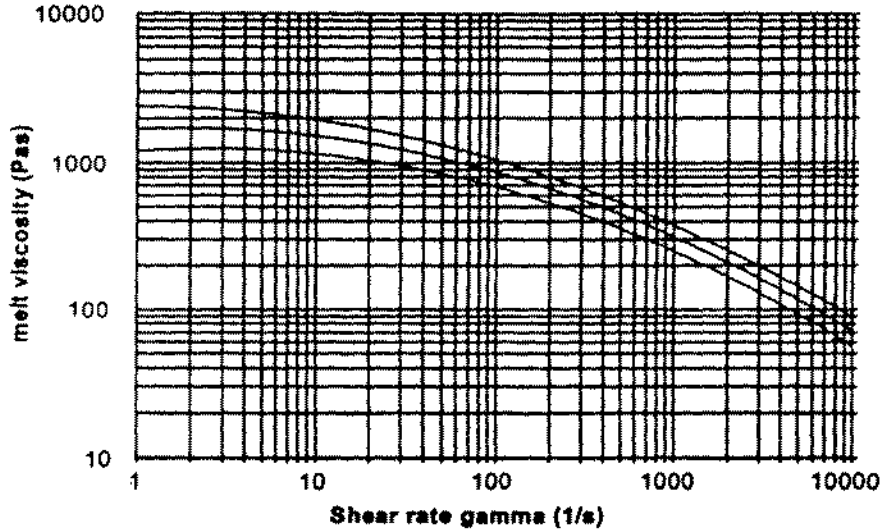
The temperature depending melt viscosity of Arnitel EL630/EM630 and are shown below in graph 2.80 and 2.81 respectively.

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



Arnitel® EL630/EM630

Capillar melt viscosity of Arnitel EM630.
240, 250 and 260°C.



Graph 2.80 and 2.81: Temperature dependency 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 | typical 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/m ² | NB | NB | ISO 180/1A |
| Izod notched -30°C (-22°F) | KJ/m ² | 4 | 4 | ISO 180/1A |
| Charpy notched 23°C (73°F) | KJ/m ² | NB | NB | ISO 179/1eA |
| Charpy notched -30°C (-22°F) | KJ/m ² | 12 | 12 | ISO 179/1eA |

* Data for dry, natural materials.

NB: No Break

Table 2.32: mechanical properties of Arnitel® EL630.

Amitel® EL630/EM630

• **Abrasion:**

Amitels show good abrasion resistance in both Taber and DIN 53516 abrasion tests. Data are shown in the Amitel general property overview (also included in the EPIC)

2.8.35 Flame retardancy:

Amitel 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:

Amitel EL630/EM630 can be used for cable jacketing 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 | typical 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 ($\tan \delta$) at 1kHz | - | 0.019 | 0.019 | IEC 250 |
| Comparative tracking index | - | 600 | 600 | IEC 112 |
| Volume resistivity | $10^{14} \Omega \cdot \text{cm}$ | 1 | 1 | IEC 93 |
| Surface resistivity | $10^{14} \Omega$ | 1 | 1 | IEC 93 |

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

2.8.37 Chemical resistance:

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

• **Hydrolysis**

Like all polyesters Amitel are sensitive to moisture, however Amitels are more stable to water than e.g. PET and PBT. graph 2.84 shows the hydrolytic stability of Amitel 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.

Product Information

COMMERCIAL

LEXAN®

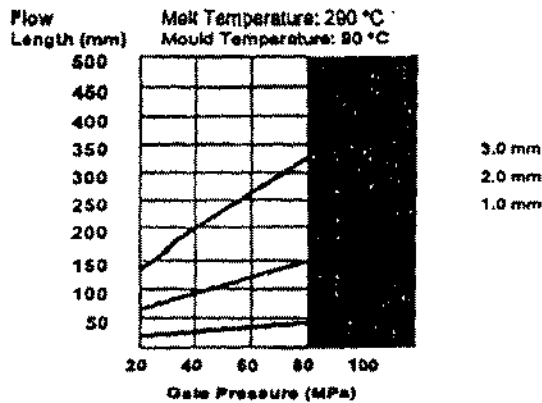
Polycarbonate Resins

123R

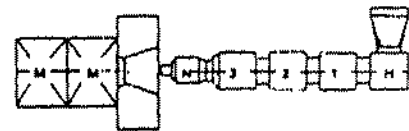
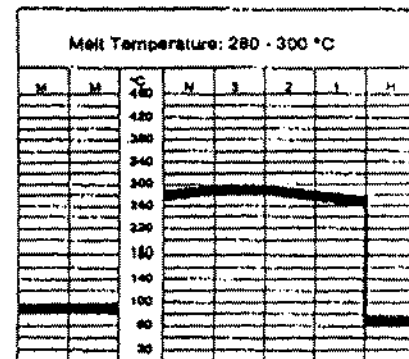
LEXAN 123R is a low viscosity multi purpose U.V. stabilized grade and contains a release agent to ensure easy processing. LEXAN 123R is available in transparent, translucent and opaque colours.

CALCULATED FLOW LENGTH INDICATION

Applied Moldflow's MUD-layer module for radial flow.



PROCESSING CONDITIONS



Technical support is recommended. Contact your local representative.

Moldflow is a registered trademark of Moldflow.

- Pre-drying temperature/time : 120 °C / 2-4 hrs
- Recommended melt temperature : 280 - 300 °C
- Recommended mould temperature : 80 - 100 °C

| TYPICAL PROPERTIES ¹⁾ | TYPICAL VALUE | UNIT | STANDARD |
|---|---------------|-------------------------|-----------|
| PHYSICAL | | | |
| Density | 1.20 | g/cm ³ | ISO 1183 |
| Water Absorption (23 °C / sat.) 1L | 0.35 | % | DIN 53495 |
| Mould Shrinkage on Tensile Bar, flow 2) | 0.6-0.7 | % | ASTM D695 |
| RHEOLOGICAL | | | |
| Melt Volume Rate, MVR 300 °C / 1.2 kg | 21 | cm ³ /10min. | ISO 1133 |



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Product Information

COMMERCIAL

LEXAN®

Polycarbonate Resins

123R

| TYPICAL PROPERTIES ¹⁾ | | TYPICAL VALUE | UNIT | STANDARD |
|--|---------------|---------------|-------------------|-----------------------|
| MECHANICAL | | | | |
| Tensile Stress at yield, | 50 mm/min | 63 | MPa | ISO 527 |
| Tensile Stress at break, | 50 mm/min | 66 | MPa | ISO 527 |
| Tensile Strain at yield, | 50 mm/min | 6.0 | % | ISO 527 |
| Tensile Strain at break, | 50 mm/min | 100 | % | ISO 527 |
| Tensile Modulus, | 1 mm/min | 2350 | MPa | ISO 527 |
| Flexural Strength at yield, | 2 mm/min | 90 | MPa | ISO 178 |
| Flexural Modulus, | 2 mm/min | 2300 | MPa | ISO 178 |
| Hardness, H368/30 | | 95 | MPa | ISO 2038/1 |
| Taber Abrasion, CS-17, 1 kg | | 10 | mg/1000cy | GE |
| IMPACT | | | | |
| Charpy Impact, notched | +23 °C | 36 | kJ/m ² | ISO 179/2C |
| Izod Impact, unnotched 80°10'4 | +23 °C | NB | kJ/m ² | ISO 180/1U |
| Izod Impact, unnotched 80°10'4 | -30 °C | NB | kJ/m ² | ISO 180/1U |
| Izod Impact, notched 80°10'4 | +23 °C | 12 | kJ/m ² | ISO 180/1A |
| Izod Impact, notched 80°10'4 | -30 °C | 10 | kJ/m ² | ISO 180/1A |
| THERMAL | | | | |
| Vicat B/50 | | 140 | °C | ISO 306 |
| Vicat B/120 | | 141 | °C | ISO 306 |
| HDT/B _e , 0.45 MPa edgew. 120°10'4/φ=100 mm | | 135 | °C | ISO 76/B _e |
| HDT/A _e , 1.5 MPa edgew. 120°10'4/φ=100 mm | | 122 | °C | ISO 76/A _e |
| Thermal Conductivity | | 0.20 | W/m °C | DIN 52612 |
| Coeff. of Lin. Therm. Exp. flow | 23 - 80 °C | 7.0 E-6 | 1/°C | DIN 63752 |
| Ball Pressure Test | 75 °C ± 2 °C | PASSED | - | IEC 335-1 |
| Ball Pressure Test | 125 °C ± 2 °C | PASSED | - | IEC 335-1 |
| Ball Pressure Test, approx. maximum | | 140 | °C | IEC 335-1 |
| Thermal Index, Electrical properties | | 130 | °C | UL 746B |
| Thermal Index, Mech. prop. with impact | | 125 | °C | UL 746B |
| Thermal Index, Mech. prop. w/o impact | | 125 | °C | UL 746B |
| FLAMMABILITY | | | | |
| 94HB Flame Class Rating ³⁾ | | 0.80 | mm | UL 94 |
| 94HB Flame Class Rating 2nd value ³⁾ | | 3.05 | mm | UL 94 |
| Oxygen Index ³⁾ | | 28 | % | ISO 4589 |
| Glow Wire Test, 650 °C, Passed at | | 1.0 | mm | IEC 606-2-1 |
| ELECTRICAL | | | | |
| Volume Resistivity | | >1.0 E15 | Ohm·m | IEC 93 |
| Surface Resistivity, ROA | | >1.0 E16 | Ohm | IEC 93 |
| Dielectric Strength, in oil, 3.2 mm | | 17.0 | kV/mm | IEC 243 |
| Relative Permittivity, | 50 Hz | 3.0 | - | IEC 250 |
| Relative Permittivity, | 1 MHz | 2.8 | - | IEC 250 |
| Dissipation Factor, | 50 Hz | 0.0010 | - | IEC 250 |
| Dissipation Factor, | 1 MHz | 0.0100 | - | IEC 250 |
| Arc Resistance, Tungsten | | 119 | sec. | ASTM D495 |
| OPTICAL | | | | |
| Light Transmission | | 88-90 | % | ASTM D1003 |
| Haze | | <0.8 | % | ASTM D1003 |
| Refractive Index | | 1.586 | - | ISO 489 |

1) Typical values only. Variations within normal tolerances are possible for various colours. All values are measured at least after 48 hours storage at 23°C/50% relative humidity. All properties, except the melt volume rate, are measured on injection moulded samples. All samples are prepared according ISO 294.

2) Only typical data for material selection purposes. Not to be used for part or tool design.
3) This rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.
4) Own measurement according to UL.



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Product Information

COMMERCIAL

LEXAN®

Polycarbonate Resins

123R

| TYPICAL PROPERTIES ¹⁾ | TYPICAL VALUE | UNIT | STANDARD |
|----------------------------------|---------------|------|----------|
|----------------------------------|---------------|------|----------|

1) Typical values only. Variations within normal tolerances are possible for various colours. All values are measured at least after 48 hours storage at 23°C/50% relative humidity. All properties, except the melt volume rate, are measured on injection moulded samples. All samples are prepared according ISO 294.

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Source ERIS, Updated 22 Dec 96, Page 3 <<<

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TECHNICAL INFORMATION (TDS 47)

CA02 SUPERGLUE High Viscosity Gap Filler

DESCRIPTION

CA02 is a High viscosity ethyl based superglue for bonding where large gap fill is important, or where the materials are absorbent. CA02 is versatile and will bond most plastics, rubbers and metals. Because of its viscosity CA02 allows additional bonding time prior to cure.

APPLICATIONS

Typical applications are ferrite cores, magnets, loud speaker cones, leather trims, metal badges, electronic components, however CA02 is versatile and will also bond cork, wood, ceramic, plastics etc.

USEFUL HINTS/NOTES

Only apply adhesive to one side. Apply pressure firmly for a few seconds until the bond forms. Allow to cure before putting into use.

PROPERTIES

Steel to Steel:.....320 daN/cm(2)
Rubber to Rubber:.....70daN/cm(2)*
Plastic to Plastic:.....100daN/cm(2)*

* Substrate failure, not adhesive.

INSTRUCTIONS FOR USE

Ensure parts are clean, dry and free from oil and grease.

PROCEDURE FOR APPLICATION

Apply sparingly to one side and hold parts until handling strength is achieved.

COMPATIBLE

ACCELERATORS/PRIMERS

Primers such as A021 or Double Strength A113 as accelerators for fillet cure or for priming absorbent surfaces.

The information contained herein is produced in good faith and is believed to be reliable but is for guidance only. Holdtite and its agents cannot assume liability or responsibility for results obtained in the use of its products by persons whose methods are outside or beyond our control. It is the users responsibility to determine the suitability of any of the products and methods of use or preparation prior to use mentioned in our literature and furthermore the users responsibility to observe and adopt such precautions as may be advisable for the protection of personnel and property in the handling and use of any of our products.

TECHNICAL FEATURES

Resin.....Ethyl Cyanoacrylate
Colour.....Clear
Cure Speed With Activator.....<5 seconds
Cure Speed Without Activator.....15-20 seconds
Viscosity.....2500cps +-500cps
Gap Fill.....0.25mm
Flash Point.....>85°C
Shelf Life.....12 months @ 20°C
Specific Gravity.....1.06
Max. Operating Temperature.....-60°C to + 90°C

CURED PERFORMANCE

Cure Time:.....<30 seconds
Tensile Strength.....320daN/cm(2)
Tensile Shear Strength.....180daN/cm(2)

STORAGE

Store in a cool area out of direct sunlight
Refrigeration to 5C gives optimum stability.

PRESENTATION

Bottles:.....20g, 50g, 500g

HEALTH & SAFETY IN USE

DANGER -Superglue bonds skin and eyes in seconds.

If accidental skin bonding happens wash with warm soapy water and prise skin apart using a blunt instrument (such as a teaspoon handle).

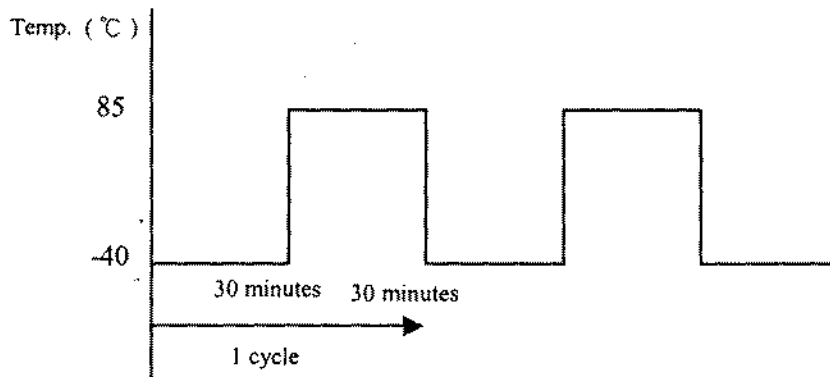
In case of eye contact, bathe immediately with water and seek immediate medical attention.

REV 21-09-99 HH

RF Antenna Cable Assembly

膠水粘著能力測試

1. 測試設備： 冷熱衝擊試驗機, 拉力測試機
2. 測試條件： -40°C ~ 85°C
3. 循環次數： 20次
4. 規範值： 7 Kg Minium



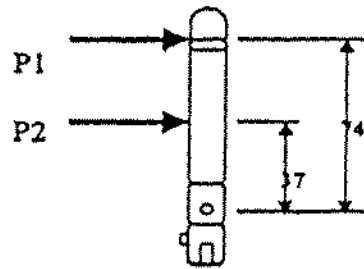
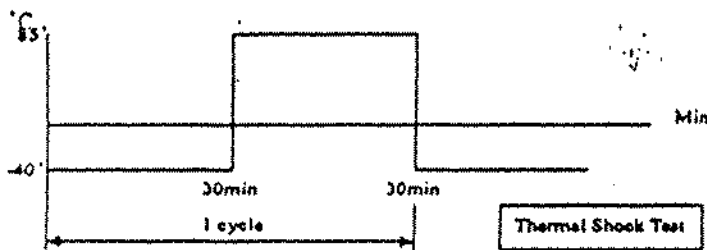
| Sample | 規範值 | 測試結果 |
|--------|------|------|
| 1 | 7 Kg | >7Kg |
| 2 | | >7Kg |
| 3 | | >7Kg |
| 4 | | >7Kg |
| 5 | | >7Kg |
| 6 | | >7Kg |
| 7 | | >7Kg |
| 8 | | >7Kg |
| 9 | | >7Kg |
| 10 | | >7Kg |

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.




| 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 |

樣品承認書

附表二

編號：M30-111++-010

| | | |
|---|------------|---------|
| 品名/型號：2.4GHz Ant. SMA R. 0 dBi W111-094-D8 | | |
| 料 號：M30-111++-010 | | |
| 申請日期：2002.11.4 | 申請部門：LAN | |
| 製造(代理)商：振旺 | 主管：Richard | 申請人：顏佑任 |
| 適用機種、PC板名：WP2000 | | |
| 規格(材質、尺寸、公差、圖面...)： | | |
| <input type="checkbox"/> 客戶之環保要求 <input checked="" type="checkbox"/> NA <input type="checkbox"/> 其它 _____ | | |
| 樣品產生來源：1. <input checked="" type="checkbox"/> 研發階段 2. <input type="checkbox"/> 設計變更 3. <input type="checkbox"/> Second Source 4. <input type="checkbox"/> 已量產，補確認 5. <input type="checkbox"/> _____ | | |
| 測試結果：on board Test ok | | |
| <input checked="" type="checkbox"/> 電子： | 測試人：顏佑任 | |
| <input type="checkbox"/> 機構： | 測試人： | |
| <input type="checkbox"/> 電源： | 測試人： | |
| <input type="checkbox"/> 軟體： | 測試人： | |
| <input type="checkbox"/> 其他： | 測試人： | |
| 關鍵特性： NA | | |
|  | | |
| 核准：Richard | 承辦：徐素君 | |


QP-005-02E Nov. 4 2002

保存期限：停止交易

零組件承認申請單

附表一

承認書編號：M30-111++-010

| | | | |
|---|--|------------------------------|----------------|
| 品名 | 2.4GHz Ant. SMA R. 0dBi W111-094-D8 | | |
| 料號 | M30-111++-010 | | |
| 檢驗依據 | <input checked="" type="checkbox"/> 圖面【 】 <input type="checkbox"/> 樣品 <input type="checkbox"/> 其他【 】 | | |
| 供應廠商 | <input checked="" type="checkbox"/> 製造商 | <input type="checkbox"/> 代理商 | 廠商名稱 <u>瑞旺</u> |
| 樣品來源 | <input checked="" type="checkbox"/> 研發階段 <input type="checkbox"/> 設計變更 <input type="checkbox"/> 第二來源 <input type="checkbox"/> 補確認(已量產) | | |
| 備註欄： | | | |
| <input type="checkbox"/> 客戶之環保要求 <input checked="" type="checkbox"/> NA <input type="checkbox"/> 其它 _____ | | | |
| 注意事項(關鍵特性)： <p style="text-align: center;">NA.</p> | | | |
|  | | | |

核准： Richard

製表： 顏佑任

QP-005-01E Nov. 4 2002

2002 / 11 / 4

保存期限：停止交易



INPUT OUTPUT

APPROVAL SHEET

CUSTOMER NAME 友旺科技(股)公司

CUSTOMER P/N M30-111+-010

DESCRIPTION 2.4G Antenna with RG178 CABLE

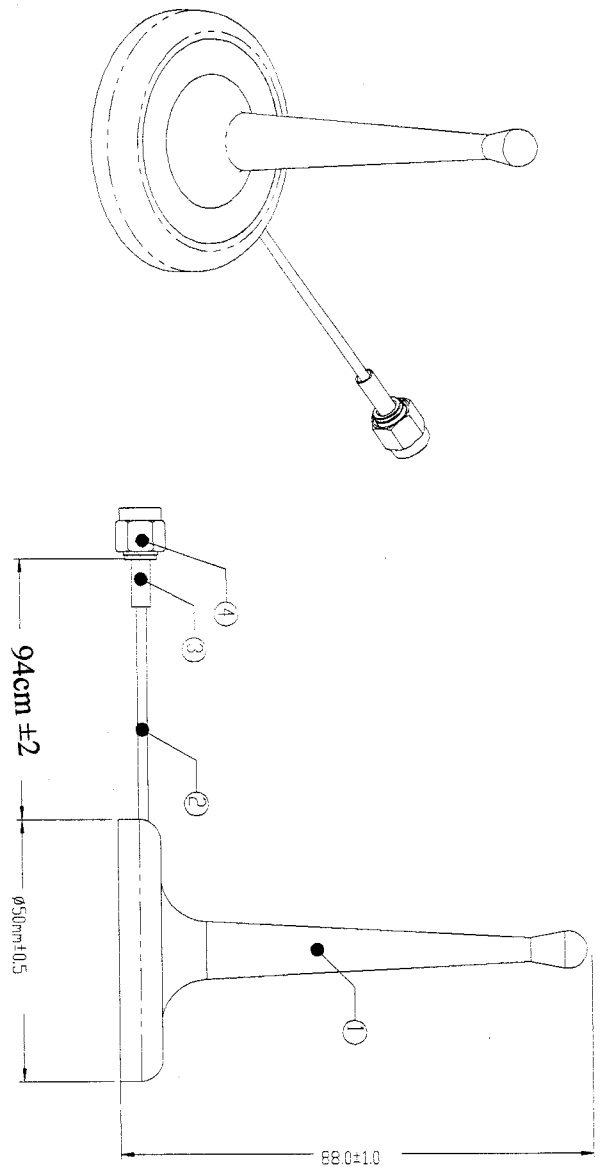
IN/OUTPUT 0111-094-D8

DATE 2002.10.29

| CUSSTOMER APPROVAL | DATE |
|--------------------|------------|
| 顏佑任 | 2002.10.29 |



ISO 9001 Certified Designer & Manufacturer
Input Output Enterprise Corp.
3F, NO. 37, PAO-SHING RD., HSIN-TIEN, TAIPEI, (231) TAIWAN, R.O.C.
TEL: (02) 2917-7528 FAX: (02) 2912-1659 E-mail: i2969@ms15.hinet.net
231 台北縣新店市寶興路37號3樓



ELECTRICAL PERFORMANCE :
 1. Impedance : 50 ohms
 2. Frequency Range : 2.4~ 2.5 GHz
 3. VSWR : 1.90 maximum

- | | | | |
|---|-----------------|-------|------------|
| 4 | RP-SMA | BRASS | GOLD PLASH |
| 3 | HEAT SHRINK TUB | NONE | NONE |
| 2 | RG-178 | NONE | NONE |
| 1 | BODY | TPR | NONE |
- ITEM DESCRIPTION MATERIALS FINISHED

| | | | | | | | | | | | | | | | | |
|------|-------------|-----|-------|------------|-----------|---------------------------|-----------------------|----------|-------|---------|----------|-------|-------|------|------|------|
| REV. | DESCRIPTION | ECN | DRAWN | DATE | REVISIONS | REMARKS | TITLE | DESIGNED | DRAWN | CHECKED | APPROVAL | SHEET | TOTAL | DATE | REV. | DATE |
| B | NEW RELEASE | | Yang | 04/08/2002 | | | 2.4~2.5GHz RF Antenna | ZEKE | ZEKE | | | 1 | 1 | | | |
| A | NEW RELEASE | | ZEKE | 15/03/2002 | | | | | | | | | | | | |
| REV. | DESCRIPTION | ECN | DRAWN | DATE | REVISIONS | REMARKS | TITLE | DESIGNED | DRAWN | CHECKED | APPROVAL | SHEET | TOTAL | DATE | REV. | DATE |
| | | | | | | THE FRONT'S DIM. X33-1025 | | | | | | | | | | |

INPUT OUTPUT

w1111-094-D8

w1111-094-D8

W111-094-D8 2.4G ANTENNA

SPECIFICATION

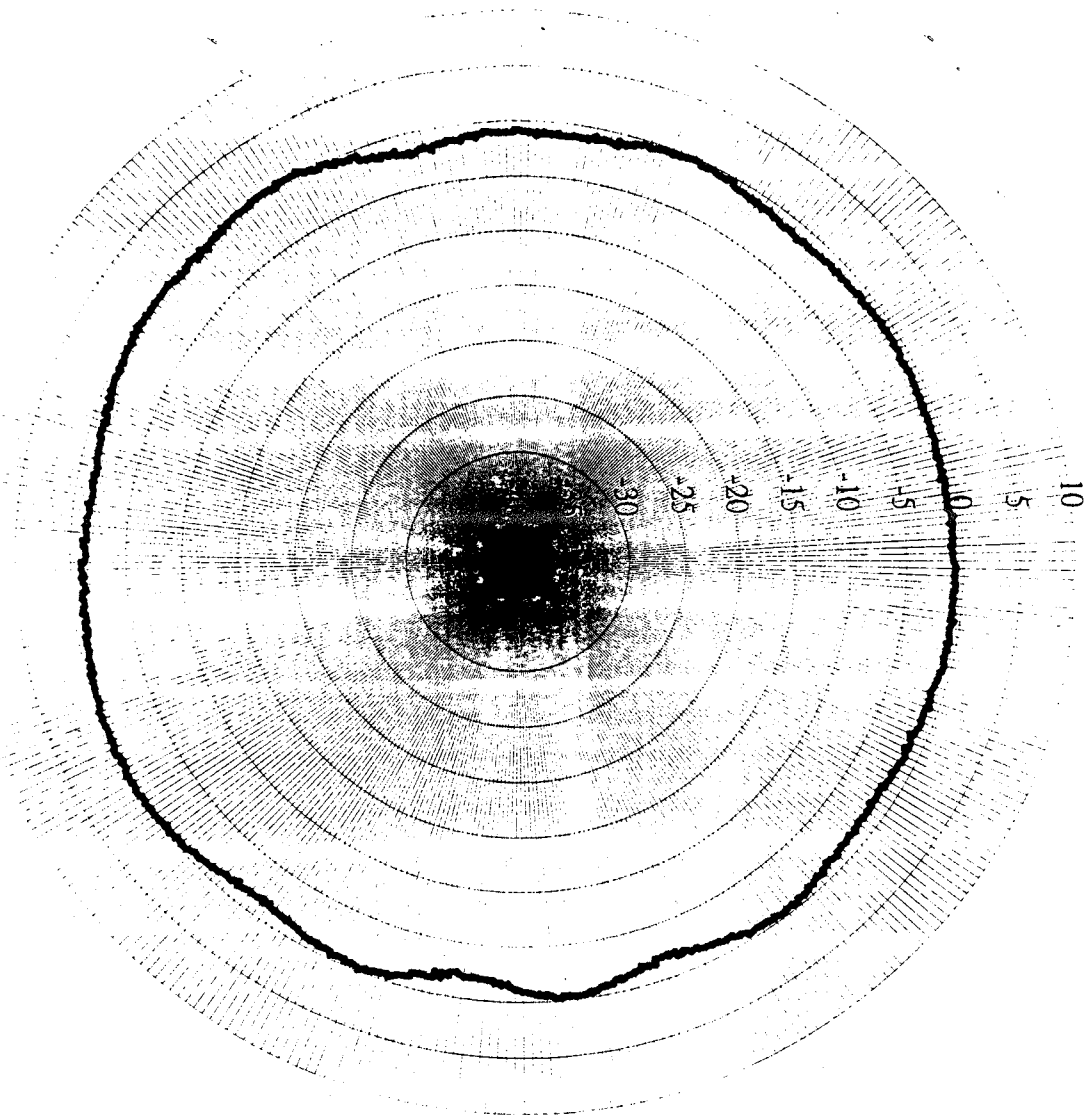
1-3,1-4,1-5 CPK

1. Electrical Properties

- 1-1 Frequency Range2.4~2.5GHz
- 1-2 Impedance.....50 Ohms nominal
- 1-3 V.S.W.R.....2.0 (Max.)
- 1-4 Return Loss.....-10.0 dB(Min.)
- 1-5 Max. Gain0dBi
- 1-6 Polarization..... Vertical
- 1-7 Admitted Power.....1W
- 1-8 Electrical Wave.....1/4 λ Dipole

2. Mechanical Properties

- 2-1 Connector.....Reverse SMA Plug Straight
- 2-2 Cable.....RG178
- 2-3 Antenna Body.....T.P.R.
- 2-4 Operating Temperature Range.....-20°C ~ +50°C
- 2-5 Storage Temperature Range..... -20°C ~ +50°C



10 ANTENNA PATTERN

ANTENNA TEST NO. W111-094-D8

TEST DATE: 2002/10/18

TEST FREQUENCY: 2450MHz

TEST POLARIZATION: VERTICAL
(H-PLANE)

TEST ANTENNA: HORN ANTENNA

TEST CHAMBER: RF CHAMBER

TEST PERSONNEL: Yang

| | | |
|-----------|-------|-----|
| MAX GAIN: | 0.50 | dbi |
| MIN GAIN: | -2.33 | dbi |
| AVE GAIN: | -0.88 | dbi |

IO ANTENNA PATTERN

ANTENNA TEST NO. W111-094-D8

TEST DATE: 2002/08/12

TEST FREQUENCY: 2450MHz

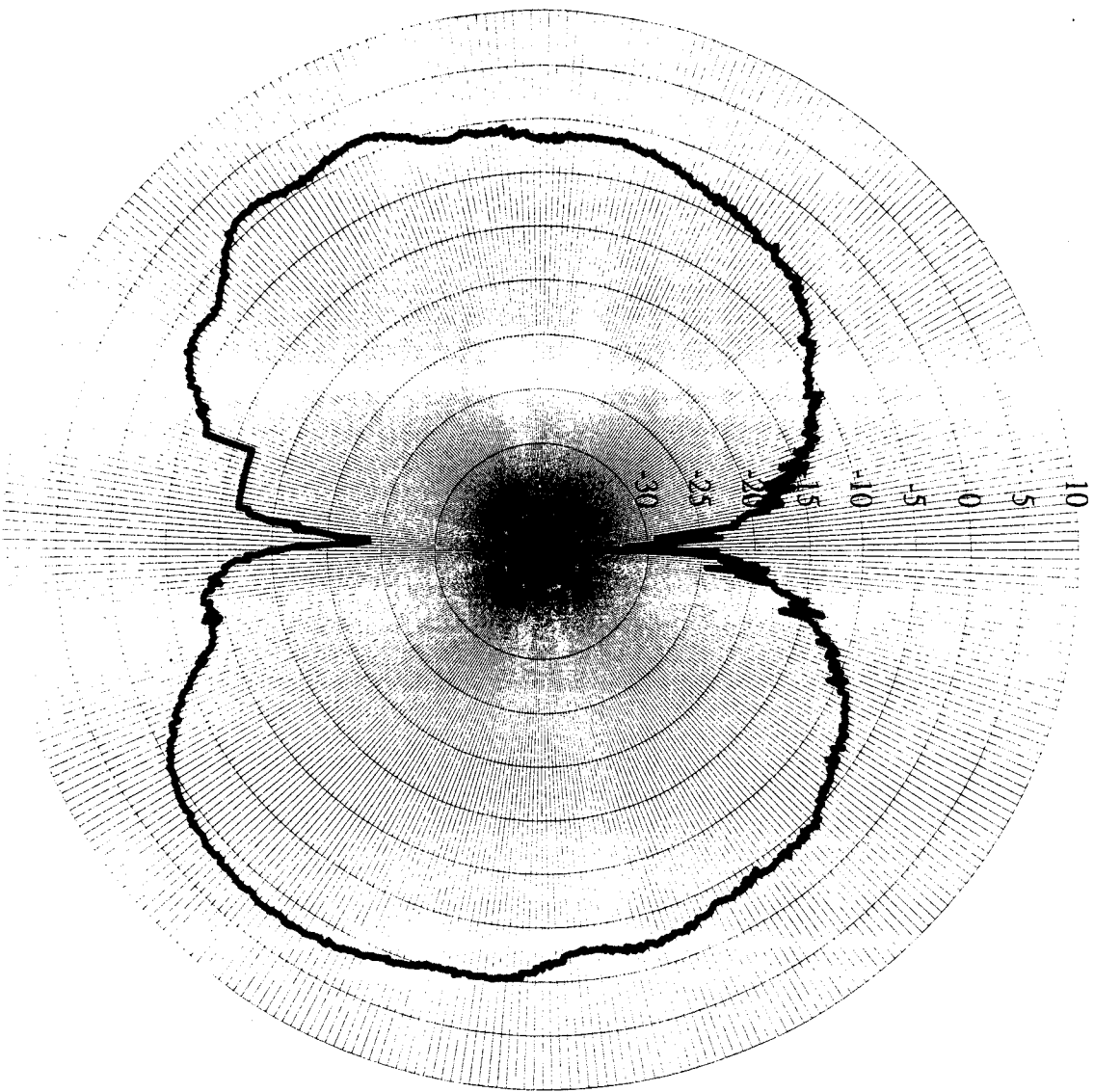
TEST POLARIZATION: HORIZONTAL
(E-PLANE)

TEST ANTENNA: HORN ANTENNA

TEST CHAMBER: RF CHAMBER

TEST PERSONNEL: Yang

| | | |
|-----------|--------|-----|
| MAX GAIN: | 2.07 | DBI |
| MIN GAIN: | -36.75 | DBI |
| AVE GAIN: | -5.49 | DBI |



MODEL: W111-094-D8
DEVICE ID:

DATE: 06/25/2002
OPERATOR:

SWEEP DATA

START: 2.3080 GHz
STOP: 2.5960 GHz
STEP: 0.0180 GHz

GATE START: -
GATE STOP: -
GATE: -
WINDOW: -

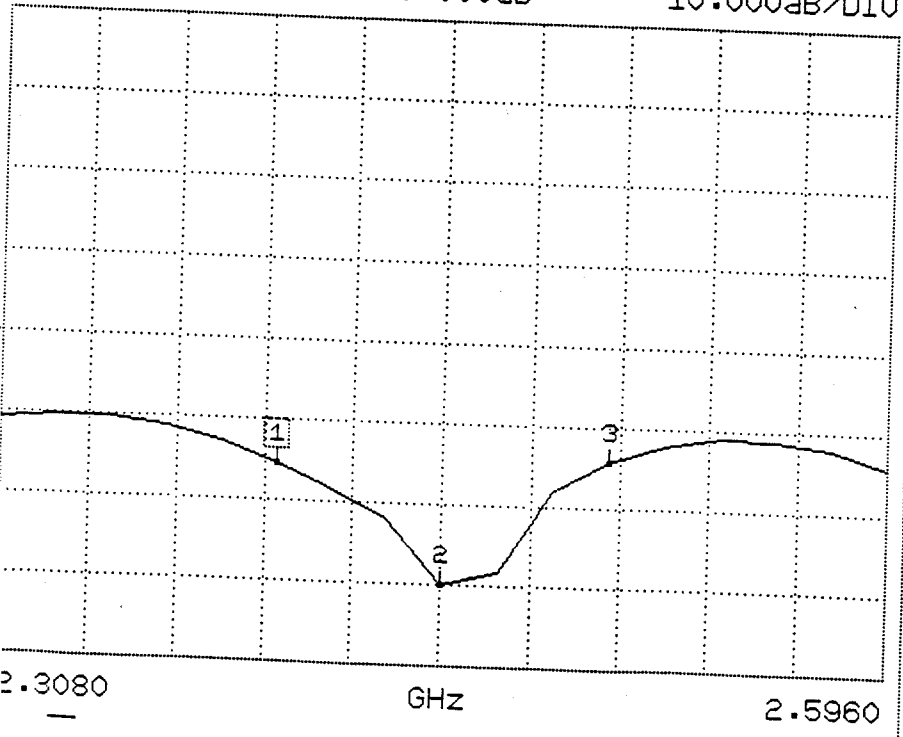
ERROR CORR: REFL ONLY
AVERAGING: 1 PTS
IF BNDWDTH: REDUCED

PARAMETER:
NORMALIZATION:
REFERENCE PLANE:
SMOOTHING:
DELAY APERTURE:

-----CH1-----
S11
OFF
0.0000 mm
0.0 PERCENT

S11 FORWARD REFLECTION

LOG MAG. REF=0.000dB 10.000dB/DIU



CH 1 - S11
REF. PLANE
0.0000 mm

MARKER 1
2.3980 GHz
-15.495 dB

MARKER TO MAX
MARKER TO MIN

2 2.4520 GHz
-29.977 dB

3 2.5060 GHz
-14.226 dB

SPECIFICATION FOR APPROVAL

DOCUMENT: A30178B001

STYLE : 200°C 30V
RG-178B/U

SIZE: 7/0.102 SCCS

RECOGNIZED:

WONDERFUL WIRE CABLE CO.,LTD

OFFICE : 72WU KONG 6TH ROAD,
WU KU IND. DISTRICT
TAIPEI HSIEN, TAIWAN

TEL : (02)22988033
FAX : (02)22988031-2

FACTORY : 17 PEI YUAN ROAD,
CHUNG-LI IND. PARK
TAIWAN, R.O.C.

TEL : (03)4527777
FAX : (03)4517214

WONDERFUL WIRE CABLE CO., LTD

SPECIFICATION

| Electrical & Physical Properties | | | | | | |
|----------------------------------|--------|------------------------|---|--------|--------|-------|
| Item | | RG-178B/U | | | | |
| Rating Temp Voltage | | 200°C 30V | | | | |
| Conductor Resistance | | 838.0 OHM/KM/20°C MAX. | | | | |
| Insulation Resistance | | 100 MEGA OHM/KM MIN. | | | | |
| Dielectric Strength | | AC 1.0 KV/Minute | | | | |
| Spark Test | | 0.5 KV | | | | |
| Insulation | Unaged | Tensile Strength | 2500 PSI MIN.(1.76 Kg / m m ²) | | | |
| | | Elongation | 200% MIN. | | | |
| | Aged | Tensile Strength | UNAGED MIN.75%(168HRS×232°C) | | | |
| | | Elongation | UNAGED MIN.75%(168HRS×232°C) | | | |
| Jacket | Unaged | Tensile Strength | 2500 PSI MIN.(1.76 Kg / m m ²) | | | |
| | | Elongation | 200% MIN. | | | |
| | Aged | Tensile Strength | UNAGED MIN.75%(168HRS×232°C) | | | |
| | | Elongation | UNAGED MIN.75%(168HRS×232°C) | | | |
| Nom. Impedance | | 50 Ohms | | | | |
| VSWR | | MAX. 1.3 at 0.4G~3GHz | | | | |
| Nom. Vel. of Prop. | | 69.5% | | | | |
| Flame Test | | VW-1 OK | | | | |
| Attenuation (dB/100m) | 50MHz | 100MHz | 400MHz | 900MHz | 1.8GHz | 3GHz |
| | 34.4 | 45.9 | 91.8 | 139.4 | 207.5 | 308.2 |

AK001/210X297/1.0

PAGE : 2

EDITION : 1.0

REVISED DATE :

MAKER :

CONFIRM :

APPROVAL :

WONDERFUL WIRE CABLE CO., LTD

SPECIFICATION

| | | | |
|---------------------|---|---------------------------------|------------------------------------|
| STYLE | 200°C 30V COAXIAL | DOCUMENT NO : A30178B001 | |
| SIZE | RG-178B/U | ESTABLISHED DATE: 2000/06/29 | |
| STANDARD : MIL-C-17 | | | |
| Conductor | Size | AWG | 30 |
| | Material | ---- | Silver-Coated Copper Clad Steel |
| | Conductors No. | ---- | 7 |
| | Conductors Size | mm | 0.102 |
| | O.D. | mm | 0.30 |
| Insulation | Average Thickness | mm | 0.28 |
| | Diameter | mm | 0.86 |
| | Material | ---- | FEP |
| | Color | ---- | Clear |
| Braid | Material | ---- | Silver-Coated Copper |
| | Construction | mm | 16 / 3 / 0.10 |
| | Coverage | % | 95 |
| Jacket | Average Thickness | mm | 0.25 |
| | Diameter | mm | 1.80 ±0.05 |
| | Material | ---- | FEP |
| | Color | ---- | |
| Marking | M17/93-RG178B/U WONDERFUL | | |
| Drawing |  | | |

AK001/210X297/1.0

EDITION : 1.0

MAKER :

CONFIRM :

REVISED DATE :

APPROVAL :

PAGE : 1