



WHA YU INDUSTRIAL CO., LTD. (HEAD OFFICE)  
TAI HWA ELECTRONIC CO., LTD.(CHINA)  
SHANGHAI HUA YU ELECTRONIC CO., LTD.(CHINA)  
AEON TECH CO., LTD. (CHINA)

## SPECIFICATION FOR APPROVAL

**CUSTOMER:** 友旺科技股份有限公司

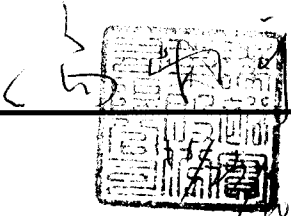
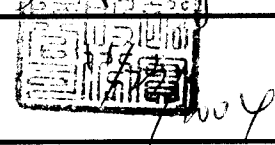
**PART NAME:** Dual band Antenna Assembly

**PART NO.:**

**REVISION:**

**W. Y. P/NO.:** C068-510330-A

**REV.:** X1

|                  | MANUFACTURER<br>SIGNATURE                                                          | CUSTOMER<br>SIGNATURE |
|------------------|------------------------------------------------------------------------------------|-----------------------|
| APPROVED<br>BY : |  |                       |
| DATE :           |  |                       |

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# INDEX

| <i>Item</i> | <i>Content</i>  | <i>Page</i> |
|-------------|-----------------|-------------|
| 1. ....     | 天線規格表           | ..... 1     |
| 2. ....     | 成品圖             | ..... 2     |
| 3. ....     | 測試報告            | ..... 3~7   |
| 4. ....     | <b>Cable</b> 規格 | ..... 8~11  |
| 5. ....     | 天線桿套材質特性        | ..... 12~13 |
| 6. ....     | 天線固定座材質特性       | ..... 14~17 |

# Dual Band RF Antenna Cable Assembly

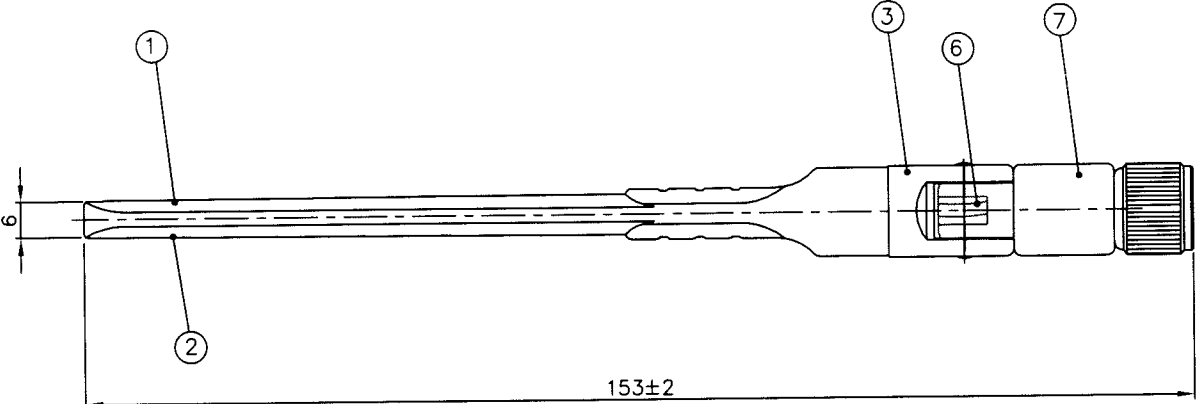
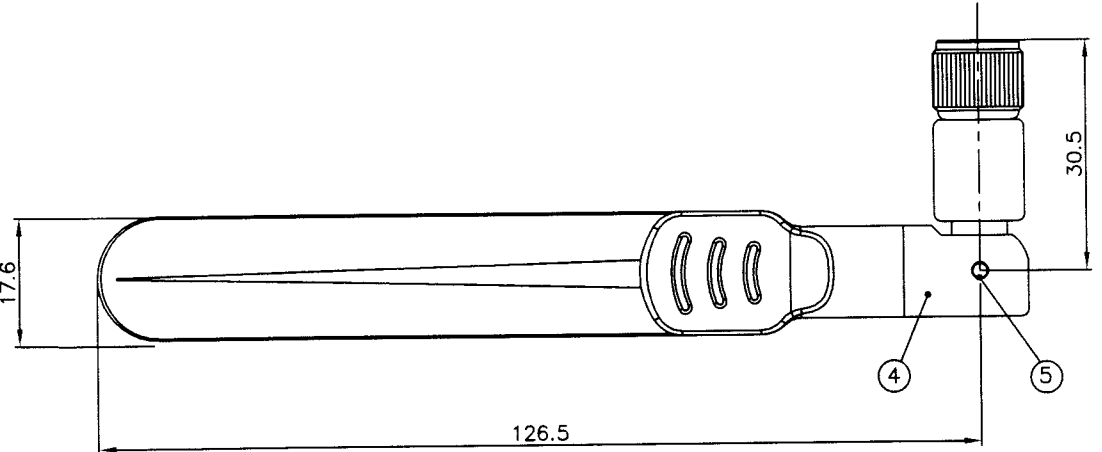
## Specification

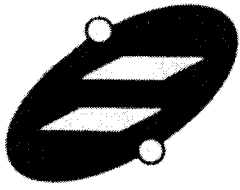
### 1. Electrical Properties :

- 1.1 Frequency Rang..... 2.4GHz ~ 2.5GHz & 5.15GHz~5.85GHz
- 1.2 Impedance ..... 50 $\Omega$  Nominal
- 1.3 VSWR ..... 1.92 Max.
- 1.4 Return Loss..... -10 dB Maximum
- 1.5 Gain..... 3dBi @ 2.4GHz  
4dBi @ 5GHz
- 1.6 Rodiation..... Omni-directional
- 1.7 Polarization..... Linear

### 2. Physical Properties :

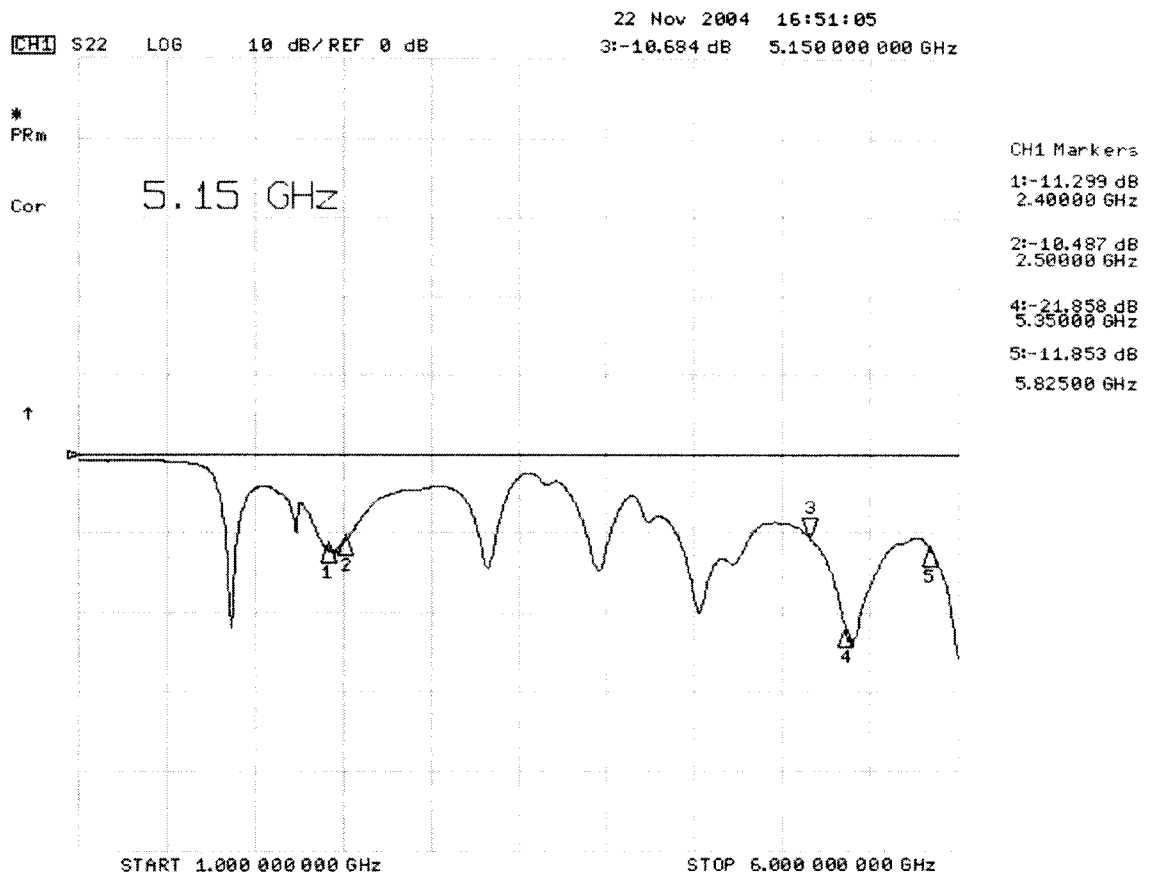
- 2.1 Antenna Cover..... ABS
- 2.2 Antenna Base..... PC
- 2.3 Antenna Base..... PBT
- 2.4 Operating Temp. .... -20°C ~ +65°C
- 2.5 Storage Temp. .... -30°C ~ +75°C
- 2.6 Color ..... Black
- 2.7 Connector..... SMA

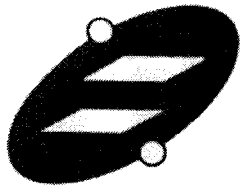
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         |                           |     |        |
|----------------------|-------------------------------------------------------------------------------------|----------|--|---------|--|--------------------------------------|--|----------------------|--|---------------------------------------------------------------------------------------|--|---------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----|--------|
| A                    |                                                                                     | B        |  | C       |  | D                                    |  | E                    |  | F                                                                                     |  | G                                           |  |                                                                                                                                                                                         |                           |     |        |
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  | REV                                                                                   |  | DATE                                        |  | DESCRIPTION                                                                                                                                                                             |                           |     |        |
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  | X1                                                                                    |  | 11/19/2004                                  |  | New Issue                                                                                                                                                                               |                           |     |        |
| 1                    |   |          |  |         |  |                                      |  |                      |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         | 2                         |     |        |
| 2                    |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         | 3                         |     |        |
| 3                    |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         | 4                         |     |        |
| 4                    |  |          |  |         |  |                                      |  |                      |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         | 5                         |     |        |
| 5                    |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         | 6                         |     |        |
| 6                    |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         | 7                         |     |        |
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  | 7                                           |  | Connector                                                                                                                                                                               | SMA Plug Straight Reverse | 1   |        |
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  | 6                                           |  | Cable                                                                                                                                                                                   | RG-178 Cable              | 1   |        |
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  | 5                                           |  | Rivet                                                                                                                                                                                   | Brass ; Cr Plated (Black) | 1   |        |
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  | 4                                           |  | Antenna Base                                                                                                                                                                            | PBT Color : Black         | 1   |        |
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  | 3                                           |  | Antenna Base                                                                                                                                                                            | PC Color : Black          | 1   |        |
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  | 2                                           |  | Antenna Housing(S)                                                                                                                                                                      | ABS Color : Black         | 1   |        |
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  | 1                                           |  | Antenna Housing(M)                                                                                                                                                                      | ABS Color : Black         | 1   |        |
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  | NO                                          |  | DESCRIPTION                                                                                                                                                                             |                           | QTY | REMARK |
| CUSTOMER'S SINGATURE |                                                                                     |          |  | XX ±3.0 |  | APPROVED                             |  | CUSTOMER: 友旺科技股份有限公司 |  |  |  | Wha Yu<br>INDUSTRIAL CO.,LTD.<br>譚裕實業股份有限公司 |  |                                                                                                                                                                                         |                           |     |        |
|                      |                                                                                     | X ±2.0   |  | CHECKED |  | PART NO :                            |  |                      |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         |                           |     |        |
|                      |                                                                                     | XX ±1.0  |  | DRAWING |  | PARTNAME: Dual band Antenna Assembly |  |                      |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         |                           |     |        |
|                      |                                                                                     | XXX ±0.1 |  | 程淑娟     |  | W.Y P/NO : C068-510330-A             |  |                      |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         |                           |     |        |
|                      |                                                                                     |          |  |         |  |                                      |  | REV UNIT FILE :      |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         |                           |     |        |
|                      |                                                                                     |          |  |         |  |                                      |  | X1 m/m SHEET : 1/1   |  |                                                                                       |  |                                             |  |                                                                                                                                                                                         |                           |     |        |
|                      |                                                                                     |          |  |         |  |                                      |  |                      |  |                                                                                       |  |                                             |  | THIS DRAWING, AND IT'S INHERANT DESIGN CONCEPTS, ARE THE PROPERTY OF WHA YU AND AS SUCH MAY NOT BE COPIED, REPRODUCED, OR GIVEN TO THIRD PARTIES WITHOUT THE WRITTEN CONSENT OF WHA YU. |                           |     |        |



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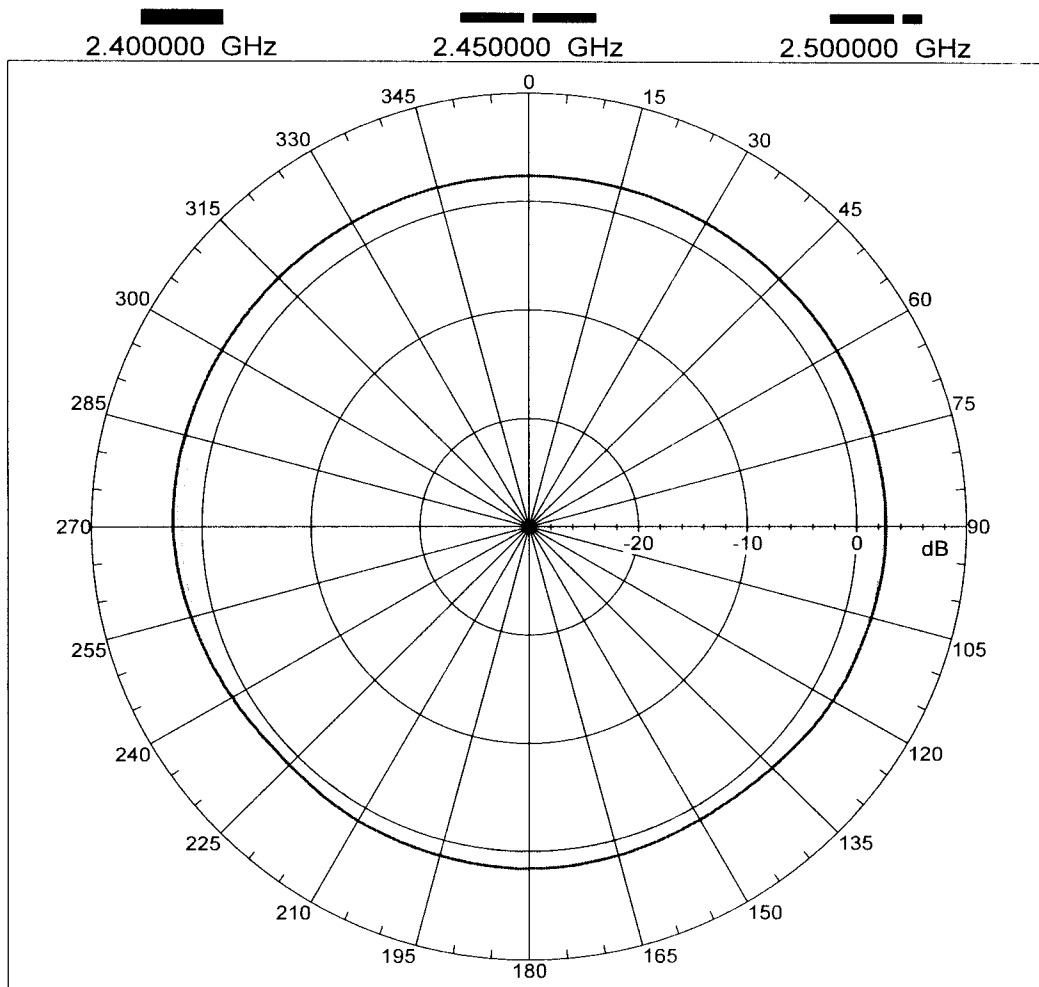
# 譚裕實業股份有限公司

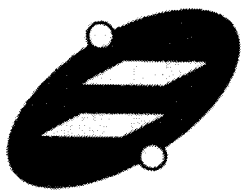
## WHA YU INDUSTRIAL CO., LTD

C068-510330-A

vertical polar

Far-field amplitude of C068-510330-A-V.nsi



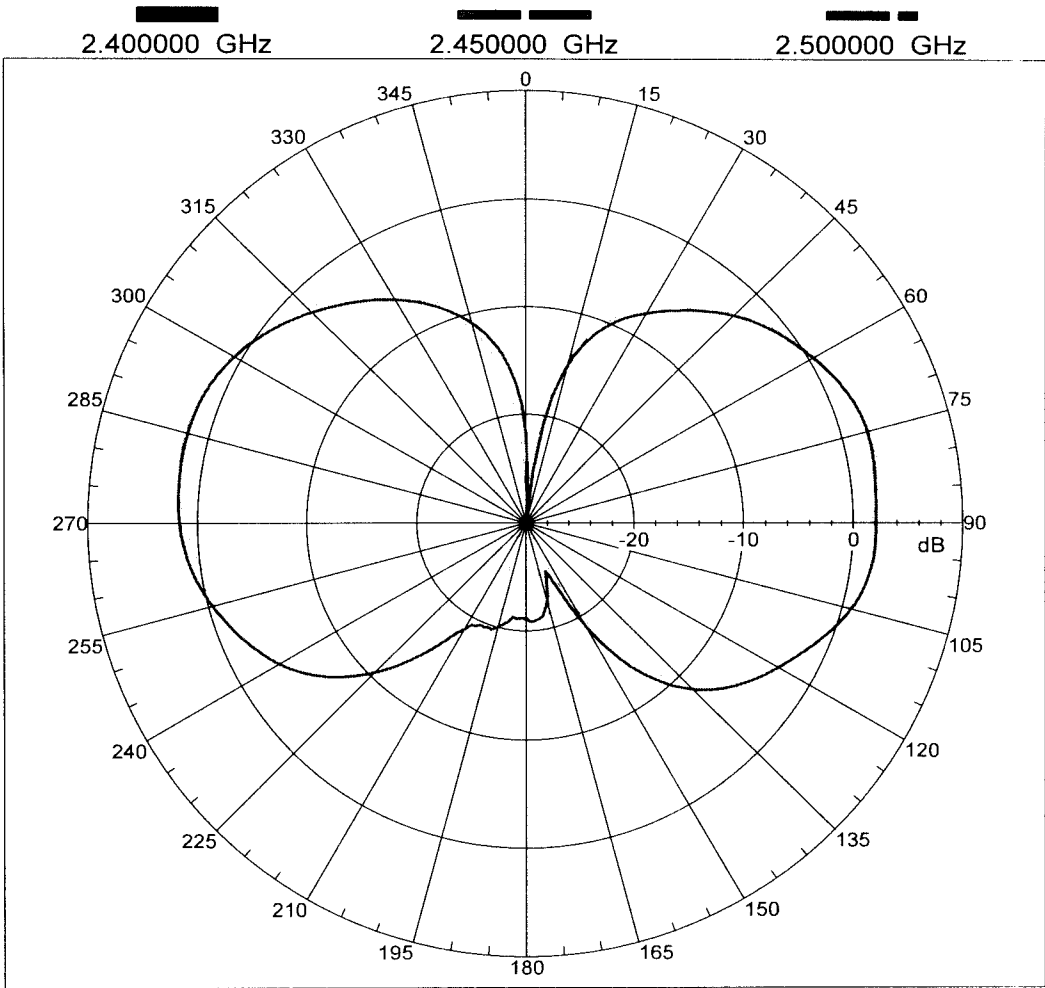


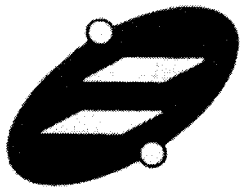
# 譚裕實業股份有限公司

## WHA YU INDUSTRIAL CO., LTD

Horizontal polar

Far-field amplitude of C068-510330-A-H.nsi



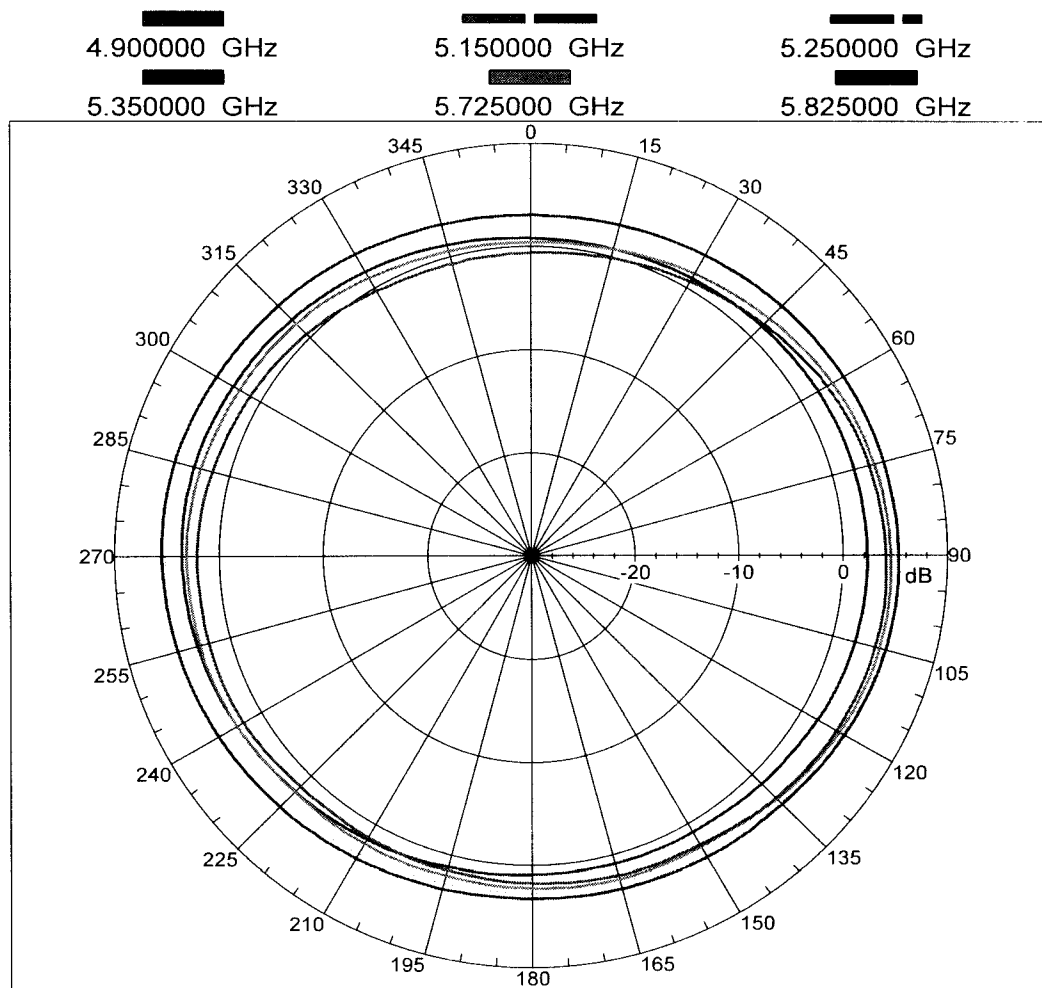


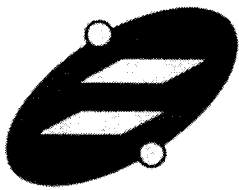
譚裕實業股份有限公司

WHA YU INDUSTRIAL CO., LTD

vertical polar

Far-field amplitude of C068-510330-A-V.nsi





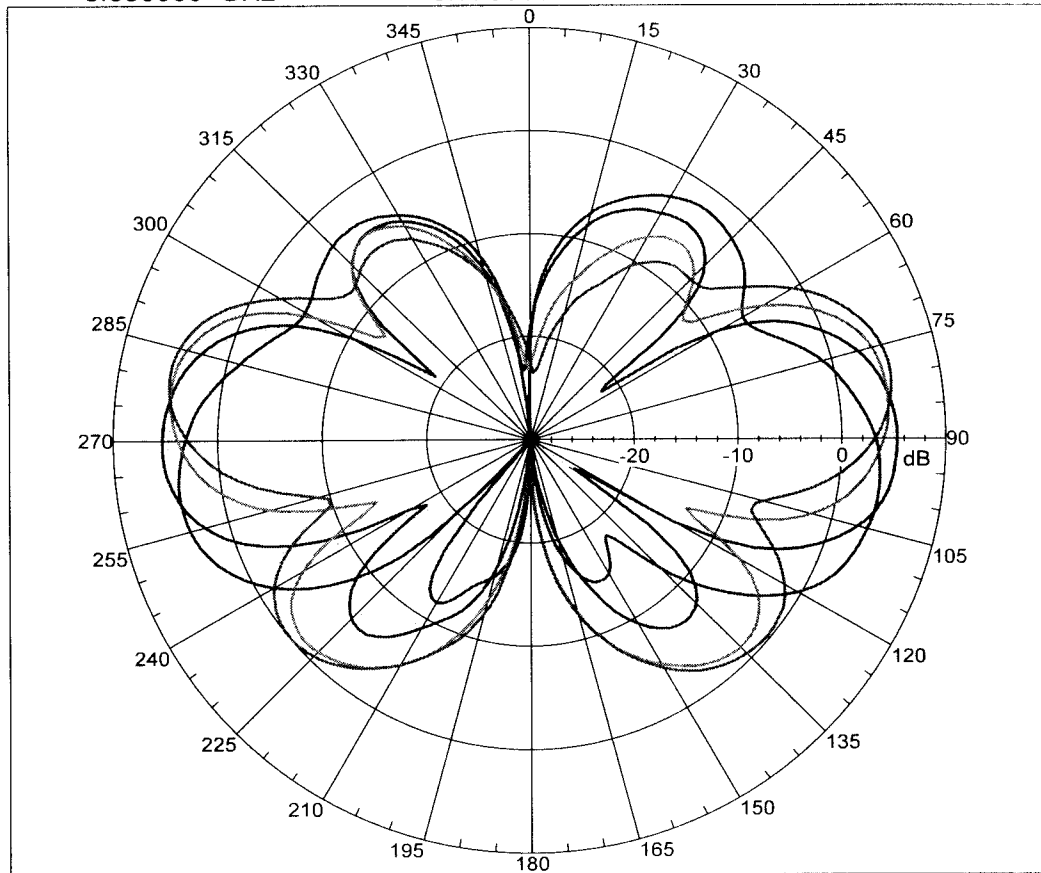
譚裕實業股份有限公司

WHA YU INDUSTRIAL CO., LTD

Horizontal polar

Far-field amplitude of C068-510330-A-H.nsi

4.900000 GHz 5.150000 GHz 5.250000 GHz  
5.350000 GHz 5.725000 GHz 5.825000 GHz



|                     |                                                  |         |               |
|---------------------|--------------------------------------------------|---------|---------------|
| RG 178 B/U          | FEP INSULATED<br>HIGH-FREQUENCY COAXIAL<br>CABLE | PAGE    | 1 / 2         |
| PRODUCT<br>STANDARD |                                                  | ISSUED  | 21. Oct. 2003 |
|                     |                                                  | REVISED |               |

## I - Scope

This specification presents a FEP insulated high-frequency coaxial cable AWG 30, 1.8 mm O.D. for internal wiring of electronic equipment, such as Computer / Notebook with wireless communication systems.

## II - Construction



| Item              |                | Unit   | Details                        |
|-------------------|----------------|--------|--------------------------------|
| 1 Inner Conductor | Material       | —      | CP-AG                          |
|                   | Composition    | No./mm | AWG 30 or 7 × 0.1              |
|                   | Dia. (approx.) | mm     | 0.305                          |
| 2 Dielectric      | Material       | —      | Extruded FEP                   |
|                   | Nom. O.D.      | mm     | 0.84 ± 0.05                    |
|                   | Color          | —      | Natural                        |
| 3 Outer Conductor | Material       | —      | Silver coated copper           |
|                   | Composition    | —      | Braided (16 / 3 / 0.1)         |
|                   | Dia. (approx.) | mm     | 1.29 ± 0.07                    |
| 4 Jacket          | Material       | —      | Extruded FEP                   |
|                   | Dia.           | mm     | 1.80 ± 0.08                    |
|                   | Color          | —      | Standard color is Light Orange |

Note

MADE BY

APPROVALS

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|                     |                                                  |         |               |
|---------------------|--------------------------------------------------|---------|---------------|
| RG 178 B/U          | FEP INSULATED<br>HIGH-FREQUENCY COAXIAL<br>CABLE | PAGE    | 2 / 2         |
| PRODUCT<br>STANDARD |                                                  | ISSUED  | 21. Oct. 2003 |
|                     |                                                  | REVISED |               |

## III – Characteristics

| Item                        | Unit     | Specified Value                                          | Note       |
|-----------------------------|----------|----------------------------------------------------------|------------|
| Temperature Rating          | ℃        | -55 ~ +200                                               |            |
| Voltage Lasting             | V        | 1000                                                     |            |
| Dielectric strength         |          | Dielectric core: No breakdown at<br>AC 3 kv for 0.2 sec. | Spark test |
|                             |          | Jacket: No breakdown at<br>AC 3 kv for 0.2 sec.          | Spark test |
| Characteristic<br>Impedance | Ω        | 50 ± 2                                                   | TDR method |
| Capacitance                 | pF / ft  | 29.4                                                     |            |
| Attenuation. (Max.)         | dB/100ft | 16.0                                                     | 100.0 MHz  |
|                             |          | 33.0                                                     | 400.0 MHz  |
|                             |          | 52.0                                                     | 1.0 GHz    |
|                             |          | 94.0                                                     | 3.0 GHz    |
| Approx. Weight              | g / m    | 7.68                                                     |            |

Note

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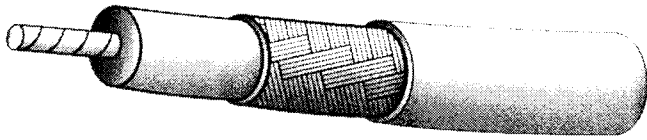
APPROVALS

*Shen Bin Chao*

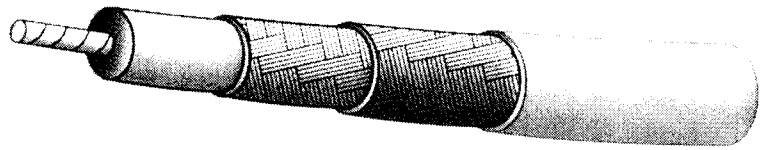
# Mil-C-17 Coaxial Cable

## QPL Approved

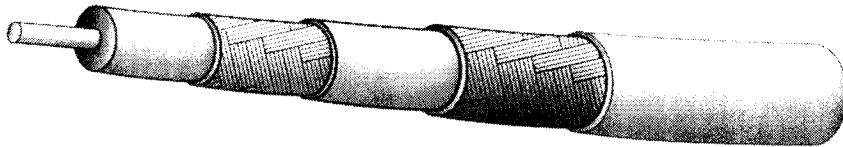
*Single braid*



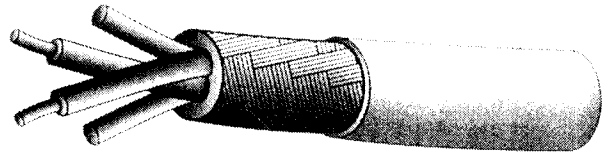
*Double braid*



*Triax*



*Twinax*



Harbour supplies a complete line of high temperature, high performance QPL approved MIL-C-17 coax cables for the military, commercial and industrial applications. The specific M17 constructions referenced are manufactured in accordance with the most recent revision of the MIL-C-17 specification. The MIL-C-17 specification defines complete physical and electrical characteristics for each M17 part number, including dimensional parameters, dielectric materials, shield construction, 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 and ETL approvals.

# Mil-C-17 Coaxial Cables

## Physical Characteristics:

| M17 Number                        | Center Conductor       | PTFE Dielectric Diameter | Shield | Jacket | Overall Diameter | Minimum Recommended Bend Radius | Operating Temp. (%C) | Weight (lbs./MFT) | Comments                         |
|-----------------------------------|------------------------|--------------------------|--------|--------|------------------|---------------------------------|----------------------|-------------------|----------------------------------|
| M17/60-RG142                      | .037" SCCS             | .116"                    | SPC(2) | FEP    | .195"            | 1.0"                            | -55 +200             | 43.0              |                                  |
| M17/93-RG178                      | .0120"(7/.004")SCCS    | .033"                    | SPC    | FEP    | .071"            | 0.4"                            | -55 +200             | 6.3               |                                  |
| M17/93-00001                      | .0120"(7/.004")SCCS    | .033"                    | SPC    | PFA    | .071"            | 0.4"                            | -55 +230             | 6.3               | M17/93-RG178 w/extended temp. r. |
| M17/94-RG179                      | .0120"(7/.004")SCCS    | .063"                    | SPC    | FEP    | .100"            | 0.4"                            | -55 +200             | 10.8              |                                  |
| M17/95-RG180                      | .0120"(7/.004")SCCS    | .102"                    | SPC    | FEP    | .141"            | 0.7"                            | -55 +200             | 19.8              |                                  |
| M17/110-RG302                     | .0253"SCCS             | .146"                    | SPC    | FEP    | .202"            | 1.0"                            | -55 +200             | 40.0              |                                  |
| M17/111-RG303                     | .037"SCCS              | .116"                    | SPC    | FEP    | .170"            | 0.9"                            | -55 +200             | 31.0              |                                  |
| M17/112-RG304                     | .059"SCCS              | .185"                    | SPC(2) | FEP    | .280"            | 1.4"                            | -55 +200             | 94.0              |                                  |
| M17/113-RG316                     | .0201"(7/.0067")SCCS   | .060"                    | SPC    | FEP    | .098"            | 0.5"                            | -55 +200             | 12.2              |                                  |
| M17/127-RG393                     | .094"(7/.0312")SC      | .285"                    | SPC(2) | FEP    | .390"            | 2.0"                            | -55 +200             | 165.0             |                                  |
| M17/128-RG400                     | .0384"(19/.008")SC     | .116"                    | SPC(2) | FEP    | .195"            | 1.0"                            | -55 +200             | 50.0              |                                  |
| M17/131-RG403                     | .0120"(7/.004")SCCS    | .033"                    | SPC(2) | FEP(2) | .116"            | 0.6"                            | -55 +200             | 15.0              | Triaxial M17/93-RG               |
| M17/152-00001                     | .0201"(7/.0067")SCCS   | .060"                    | SPC(2) | FEP    | .114"            | 0.6"                            | -55 +200             | 18.5              | Double shielded M17/113-RG316    |
| M17/158-00001                     | .037"SCCS              | .116"                    | SPC(2) | FEP    | .195"            | 1.0"                            | -55 +200             | 56.0              | Unswcpt M17/60-RG                |
| M17/169-00001                     | .0120"(7/.004")SCCS    | .033"                    | SPC    | FEP    | .071"            | 0.4"                            | -55 +200             | 6.3               | Unswcpt M17/93-RG                |
| M17/170-00001                     | .037"SCCS              | .116"                    | SPC    | FEP    | .170"            | 0.9"                            | -55 +200             | 39.0              | Unswcpt M17/111-RG               |
| M17/172-00001                     | .0201"(7/.0067")SCCS   | .060"                    | SPC    | FEP    | .098"            | 0.5"                            | -55 +200             | 11.5              | Unswcpt M17/113-RG               |
| M17/174-00001                     | .094"(7/.0312")SCCS    | .285"                    | SPC(2) | FEP    | .390"            | 2.0"                            | -55 +200             | 175.0             | Unswcpt M17/127-RG               |
| M17/175-00001                     | .0384"(19/.008")SC     | .116"                    | SPC(2) | FEP    | .390"            | 1.0"                            | -55 +200             | 50.0              | Unswcpt M17/128-RG               |
| M17/176-00002                     | .0235"(19/.005")SPA(2) | .042"                    | SPA    | PFA    | .129"            | 0.6"                            | -55 +230             | 18.0              | Controlled impedance twinax      |
| PTFE Tape Wrap Jacketed RG Cables |                        |                          |        |        |                  |                                 |                      |                   |                                  |
| RG 187 A/U                        | .0120"(7/.004)SCCS     | .063                     | SPC    | PTFE   | .100"            | 0.5"                            | -55 +250             | 10.0              | Flexible, 250° C. rat            |
| RG 188 A/U                        | .0201"(7/.0067)SCCS    | .060                     | SPC    | PTFE   | .100"            | 0.5"                            | -55 +250             | 11.0              | Flexible, 250° C. rat            |
| RG 195 A/U                        | .0120"(7/.004)SCCS     | .102                     | SPC    | PTFE   | .141"            | 0.7"                            | -55 +250             | 18.0              | Flexible, 250° C. rat            |
| RG 196 A/U                        | .0120"(7/.004)SCCS     | .034                     | SPC    | PTFE   | .067"            | 0.4"                            | -55 +250             | 6.0               | Flexible, 250° C. rat            |

## Electrical Characteristics:

| M17 Number                        | Impedance (ohms) | Capacitance (pF/ft) | Max. Operating Voltage (RMS) | Maximum attenuation (dB/100ft) @ |         |       |       |       |        | Max Frequency (GHz) |
|-----------------------------------|------------------|---------------------|------------------------------|----------------------------------|---------|-------|-------|-------|--------|---------------------|
|                                   |                  |                     |                              | 100 MHz                          | 400 MHz | 1 GHz | 3 GHz | 5 GHz | 10 GHz |                     |
| M17/60-RG142                      | 50 +/- 2         | 29.4                | 1900                         | 5.5                              | 11.7    | 19.0  | 35.0  | 48.0  | -      | 17.4                |
| M17/93-RG178                      | 50 +/- 2         | 29.4                | 1000                         | 16.0                             | 33.0    | 52.0  | 94.0  | -     | -      | 3.0                 |
| M17/93-00001                      | 50 +/- 2         | 29.4                | 1000                         | 16.0                             | 33.0    | 52.0  | 94.0  | -     | -      | 3.0                 |
| M17/94-RG179                      | 75 +/- 3         | 19.4                | 1200                         | -                                | 21.0    | -     | -     | -     | -      | -                   |
| M17/95-RG180                      | 95 +/- 5         | 16.4                | 1500                         | -                                | 17.0    | -     | -     | -     | -      | -                   |
| M17/110-RG302                     | 75 +/- 3         | 19.4                | 2300                         | -                                | 8.0     | -     | 26.0  | -     | -      | -                   |
| M17/111-RG303                     | 50 +/- 2         | 29.4                | 1900                         | 5.9                              | 8.0     | 15.0  | 28.0  | -     | -      | -                   |
| M17/112-RG304                     | 50 +/- 3         | 29.4                | 3000                         | 2.7                              | 6.4     | 11.1  | 22.0  | 30.0  | -      | 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   | 12.4                |
| 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  | 12.4                |
| M17/158-00001                     | 50 +/- 2         | 29.4                | 1900                         | -                                | 9.5     | -     | -     | -     | -      | -                   |
| M17/169-00001                     | 50 +/- 2         | 29.4                | 1000                         | -                                | 29.0    | -     | -     | -     | -      | -                   |
| M17/170-00001                     | 50 +/- 2         | 29.4                | 1900                         | -                                | 8.6     | -     | -     | -     | -      | -                   |
| M17/172-00001                     | 50 +/- 2         | 29.4                | 1200                         | -                                | 21.0    | -     | -     | -     | -      | -                   |
| M17/174-00001                     | 50 +/- 2         | 29.4                | 2500                         | -                                | 5.0     | -     | -     | -     | -      | -                   |
| M17/175-00001                     | 50 +/- 2         | 29.4                | 1900                         | -                                | 10.5    | -     | -     | -     | -      | -                   |
| M17/176-00001                     | 77 +/- 7         | 19.0                | 1000                         | -                                | -       | -     | -     | -     | -      | -                   |
| PTFE Tape Wrap Jacketed RG Cables |                  |                     |                              |                                  |         |       |       |       |        |                     |
| RG 187 A/U                        | 75 +/- 3         | 19.4                | 1200                         | -                                | 21.0    | -     | -     | -     | -      | 3                   |
| RG 188 A/U                        | 50 +/- 2         | 29.4                | 1200                         | 11.0                             | 21.0    | 38.0  | 58.0  | -     | -      | 3                   |
| RG 195 A/U                        | 95 +/- 5         | 15.4                | 1500                         | -                                | 17.0    | -     | -     | -     | -      | 3                   |
| RG 196 A/U                        | 50 +/- 2         | 29.4                | 1000                         | -                                | 29.0    | -     | -     | -     | -      | 3                   |

\*Maximum frequencies\* are those as referenced on individual sheet sheets of the MIL-C-17 specification. No values are given for unswept construction as the specification recommends these cables should not be used above 400 MHz. (All figures referenced above are nominal unless otherwise specified.)



泛用級 ABS, POLYLAC<sup>®</sup> PA-757

VIW

材料特性

| 特性(Properties)                                  | 測試方法(Test Method)  | 測試條件(Test Condition) | 單位(Unit)                                 | PA-757        |
|-------------------------------------------------|--------------------|----------------------|------------------------------------------|---------------|
| 引張強度<br>Tensile Strength                        | ASTM D638          | 1/8",6 mm/min        | Kg/cm <sup>2</sup> (lb/in <sup>2</sup> ) | 480(6800)     |
| 延伸率<br>Tensile Elongation                       | ASTM D638          | 1/8",6 mm/min        | %                                        | 20            |
| 彎曲強度<br>Flexural Strength                       | ASTM D790          | 1/4",2.8 mm/min      | Kg/cm <sup>2</sup> (lb/in <sup>2</sup> ) | 820(11660)    |
| 彎曲彈性率<br>Flexural Modulus                       | ASTM D790          | 1/4",2.8 mm/min      | Kg/cm <sup>2</sup> (lb/in <sup>2</sup> ) | 27000(380000) |
| IZOD 衝擊強度<br>Izod Impact Strength               | ASTM D256(Notched) | 1/4",23℃             | Kg-cm/cm(ft-lb/in)                       | 18(3.3)       |
|                                                 |                    | 1/8",23℃             | Kg-cm/cm(ft-lb/in)                       | 20(3.7)       |
| 流動係數<br>Melt Flow Index                         | ASTM D1238         | 200℃ ,5Kg            | g/10min                                  | 1.8           |
| 硬度<br>Hardness                                  | ASTM D785          | 1/2"                 | R Scale                                  | 116           |
| 比重<br>Specific Gravity                          | ASTM D792          | 23℃                  | -                                        | 1.05          |
| 軟化點<br>Vicat Softening Temp                     | ASTM D1525         | 1/8",50℃ /hr         | ℃ (°F)                                   | 105(221)      |
| 熱變形溫度 H.D.T<br>Annealed(85℃ ,8hr)<br>Unannealed | ASTM D648          | 1/4",120℃ /hr        | ℃ (°F)                                   | 99(210)       |
|                                                 |                    |                      |                                          | 88(190)       |
| 燃燒率<br>Flammability                             | UL 94              | -                    | -                                        | 1/16"HB       |

以上數據僅代表一般通用數據，不代表每一產品的規格值

若有任何疑問請洽產品推廣課 06-2665000, 06-2663000

QMFZ2 Component - Pla:

Wednesday, August 29, 2001

E56070

CHI MEI CORPORATION

59-1 SAN CHIA JEN TE TAINAN HSIEN TAIWAN

Material Designation: PA-757 (+)

Product Description: Acrylonitrile Butadiene Styrene (ABS), designated "Polylac" furnished as pellets.

| Color | Min. Thick. | Flame Class | HWI | HAI     | RTI Elec | RTI Imp | RTI Str   | IEC GWIT | IEC GWFI |
|-------|-------------|-------------|-----|---------|----------|---------|-----------|----------|----------|
| ALL   | 1.5         | HB          | 4   | 0       | 85       | 80      | 85        | -        | -        |
|       | 3           | HB          | 3   | 0       | 85       | 80      | 85        | -        | -        |
|       |             | CTI: 0      |     | HVTR: 1 | D495: 1  |         | IEC BP: - |          |          |

(+) Optional prefix or suffix may be used to denote 0-0.5% acid scavengers.

Report Date: 06/23/1983

Underwriters Laboratories Inc®

267295002

UL94 small-scale test data does not pertain to building materials, furnishings and related contents. UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in components and parts of end-product devices and appliances, where the acceptability of the combination is determined by ULL.



# CALIBRE 700 series

## Ignition Resistant Resins

These CALIBRE® resins are formulated and produced to supply both clarity and enhanced ignition resistance. They do so while maintaining excellent physical properties and processability. Grades are available with additives for improved mould release and/or UV stabilisation.

CALIBRE 700: No mould release, no UV stabilisation. CALIBRE 701: Only mould release. CALIBRE 702: Only UV stabilisation. CALIBRE 703: Mould release and UV stabilisation.

### Applications

- Industrial switches
- Circuit breakers
- Plugs, sockets and switches
- Street lights
- Safety lights
- Reflectors

| Properties                                | Test method              | Value    | Value    |
|-------------------------------------------|--------------------------|----------|----------|
| Products, Units                           |                          | 700-10   | 700-15   |
| <b>Physical</b>                           |                          |          |          |
| Melt Flow Rate (300°C, 1.2kg), g/10 min.  | ISO 1133                 | 10       | 15       |
| Density, kg/m³                            | ISO 1183                 | 1200     | 1200     |
| Mould Shrinkage, %                        | ASTM D-955               | 0.5-0.7  | 0.5-0.7  |
| <b>Optical</b>                            |                          |          |          |
| Light Transmittance, %                    | ASTM D1003               | 84-88    | 84-88    |
| <b>Thermal</b>                            |                          |          |          |
| HDT 0.45 MPa, annealed, °C                | ISO 75                   | 144      | 142      |
| HDT 1.82 MPa, annealed, °C                | ISO 75                   | 140      | 139      |
| HDT 1.82 MPa, unannealed, °C              | ISO 75                   | 123      | 122      |
| Vicat Softening Point (B/50), °C          | ISO 306B                 | 149      | 147      |
| <b>Mechanical</b>                         |                          |          |          |
| Tensile Strength at Yield, MPa            | ISO 527                  | 60       | 60       |
| Tensile Strength at Rupture, MPa          | ISO 527                  | 66       | 66       |
| Elongation at Yield, %                    | ISO 527                  | 6        | 6        |
| Elongation at Rupture, %                  | ISO 527                  | 120      | 120      |
| Tensile Modulus, MPa                      | ISO 527                  | 2300     | 2300     |
| Flexural Strength, MPa                    | ISO 178                  | 100      | 100      |
| Flexural Modulus, MPa                     | ISO 178                  | 2400     | 2400     |
| Izod Notched (23°C), J/m                  | ISO 180                  | 900      | 850      |
| Izod Unnotched (23°C), J/m                | ISO 180                  | no break | no break |
| Charpy Notched (23°C), kJ/m²              | ISO 179                  | 30       | 20       |
| <b>Flammability Rating <sup>(1)</sup></b> |                          |          |          |
| 1.6 mm                                    | UL-94                    | V2       | V2       |
| 3.2 mm                                    | UL-94                    | V0       | V0       |
| <b>Electrical</b>                         |                          |          |          |
| GWT 2.0 mm, 5 sec., °C                    | IEC 695-2-1              | 960      | 960      |
| Ball Indentation Temperature, °C          | IEC 598-1 <sup>(2)</sup> | > 125    | > 125    |
| Comp. Tracking Index (2.0 mm), V          | IEC 112                  | 250      | 250      |

(1) These numerical flame spread ratings are small scale test values and are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

(2) Ball Indentation Temperature is described in IEC 598-1.

\*Trademark of The Dow Chemical Company

See "Safety and Handling Considerations" and "Medical Application Policy"



VALOX® 310SE0

Americas: COMMERCIAL

Unreinforced. UL94V-0/5VA rated. For electrical industry; bobbins, keyboard switches and switch components, and appliance housings.

Property

| TYPICAL PROPERTIES <sup>(1)</sup>            |           |        |             |
|----------------------------------------------|-----------|--------|-------------|
| MECHANICAL                                   | Value     | Unit   | Method      |
| Tensile Stress, yld, Type I, 50 mm/min       | 59        | MPa    | ASTM D 638  |
| Tensile Stress, brk, Type I, 50 mm/min       | 59        | MPa    | ASTM D 638  |
| Tensile Strain, brk, Type I, 50 mm/min       | 80        | %      | ASTM D 638  |
| Flexural Stress, yld, 1.3 mm/min, 50 mm span | 101       | MPa    | ASTM D 790  |
| Flexural Stress, brk, 1.3 mm/min, 50 mm span | 101       | MPa    | ASTM D 790  |
| Flexural Modulus, 1.3 mm/min, 50 mm span     | 2620      | MPa    | ASTM D 790  |
| Hardness, Rockwell R                         | 120       | -      | ASTM D 785  |
| IMPACT                                       | Value     | Unit   | Method      |
| Izod Impact, unnotched, 23°C                 | 1602      | J/m    | ASTM D 4812 |
| Izod Impact, notched, 23°C                   | 37        | J/m    | ASTM D 256  |
| Gardner, 23°C                                | 34        | J      | ASTM D 3029 |
| Modified Gardner, 23°C                       | 34        | J      | ASTM D 3029 |
| THERMAL                                      | Value     | Unit   | Method      |
| HDT, 0.45 MPa, 6.4 mm, unannealed            | 163       | °C     | ASTM D 648  |
| HDT, 1.82 MPa, 6.4 mm, unannealed            | 71        | °C     | ASTM D 648  |
| CTE, -40°C to 40°C, flow                     | 7.92E-05  | 1/°C   | ASTM E 831  |
| CTE, 60°C to 138°C, flow                     | 1.31E-04  | 1/°C   | ASTM E 831  |
| Relative Temp Index, Elec                    | 120       | °C     | UL 746B     |
| Relative Temp Index, Mech w/impact           | 120       | °C     | UL 746B     |
| Relative Temp Index, Mech w/o impact         | 140       | °C     | UL 746B     |
| PHYSICAL                                     | Value     | Unit   | Method      |
| Specific Gravity                             | 1.39      | -      | ASTM D 792  |
| Specific Volume                              | 0.72      | cm³/g  | ASTM D 792  |
| Water Absorption, 24 hours                   | 0.08      | %      | ASTM D 570  |
| Mold Shrinkage, flow, 0.75-2.3 mm            | 0.9 - 1.6 | %      | GE Method   |
| Mold Shrinkage, flow, 2.3-4.6 mm             | 1.5 - 2.3 | %      | GE Method   |
| Mold Shrinkage, xflow, 0.75-2.3 mm           | 1 - 1.7   | %      | GE Method   |
| Mold Shrinkage, xflow, 2.3-4.6 mm            | 1.6 - 2.4 | %      | GE Method   |
| ELECTRICAL                                   | Value     | Unit   | Method      |
| Volume Resistivity                           | >1.6E+16  | Ohm-cm | ASTM D 257  |
| Dielectric Strength, in air, 3.2 mm          | 18.4      | kV/mm  | ASTM D 149  |

|                                             |         |          |            |
|---------------------------------------------|---------|----------|------------|
| Dielectric Strength, in oil, 1.6 mm         | 22      | kV/mm    | ASTM D 149 |
| Relative Permittivity, 100 Hz               | 3.1     | -        | ASTM D 150 |
| Relative Permittivity, 1 MHz                | 3.1     | -        | ASTM D 150 |
| Dissipation Factor, 100 Hz                  | 0.002   | -        | ASTM D 150 |
| Dissipation Factor, 1 MHz                   | 0.02    | -        | ASTM D 150 |
| Arc Resistance, Tungsten {PLC}              | 6       | PLC Code | ASTM D 495 |
| Hot Wire Ignition {PLC}                     | 2       | PLC Code | UL 746A    |
| High Voltage Arc Track Rate {PLC}           | 4       | PLC Code | UL 746A    |
| High Ampere Arc Ign, surface {PLC}          | 0       | PLC Code | UL 746A    |
| Comparative Tracking Index (UL) {PLC}       | 3       | PLC Code | UL 746A    |
| FLAME CHARACTERISTICS                       | Value   | Unit     | Method     |
| UL Recognized, 94V-0 Flame Class Rating (3) | 0.7     | mm       | UL 94      |
| UL Recognized, 94-5VA Rating (3)            | 3       | mm       | UL 94      |
| CSA (See File for complete listing)         | LS88480 | File No. | CSA LISTED |

Source GMD, last updated:04/14/2003

Processing

| Parameter                   |               |      |
|-----------------------------|---------------|------|
| Injection Molding           | Value         | Unit |
| Drying Temperature          | 120           | °C   |
| Drying Time                 | 3 - 4         | hrs  |
| Drying Time (Cumulative)    | 12            | hrs  |
| Maximum Moisture Content    | 0.02          | %    |
| Melt Temperature            | 245 - 260     | °C   |
| Nozzle Temperature          | 240 - 255     | °C   |
| Front - Zone 3 Temperature  | 245 - 260     | °C   |
| Middle - Zone 2 Temperature | 240 - 255     | °C   |
| Rear - Zone 1 Temperature   | 230 - 250     | °C   |
| Mold Temperature            | 50 - 75       | °C   |
| Back Pressure               | 0.3 - 0.7     | MPa  |
| Screw Speed                 | 50 - 100      | rpm  |
| Shot to Cylinder Size       | 40 - 80       | %    |
| Vent Depth                  | 0.013 - 0.025 | mm   |

Source GMD, last updated:04/14/2003

THESE PROPERTY VALUES ARE NOT INTENDED FOR SPECIFICATION PURPOSES.

PLEASE CHECK WITH YOUR (LOCAL SALES OFFICE) FOR AVAILABILITY IN YOUR REGION

- (1) Typical values only. Variations within normal tolerances are possible for various colors. All values are measured after at least 48 hours storage at 23°C/50% relative humidity. All properties, except the melt volume and melt flow rates, are measured on injection molded samples. All samples tested under ISO test standards are prepared according to ISO 294.
- (2) Only typical data for 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) Internal measurements according to UL standards.

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