

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.

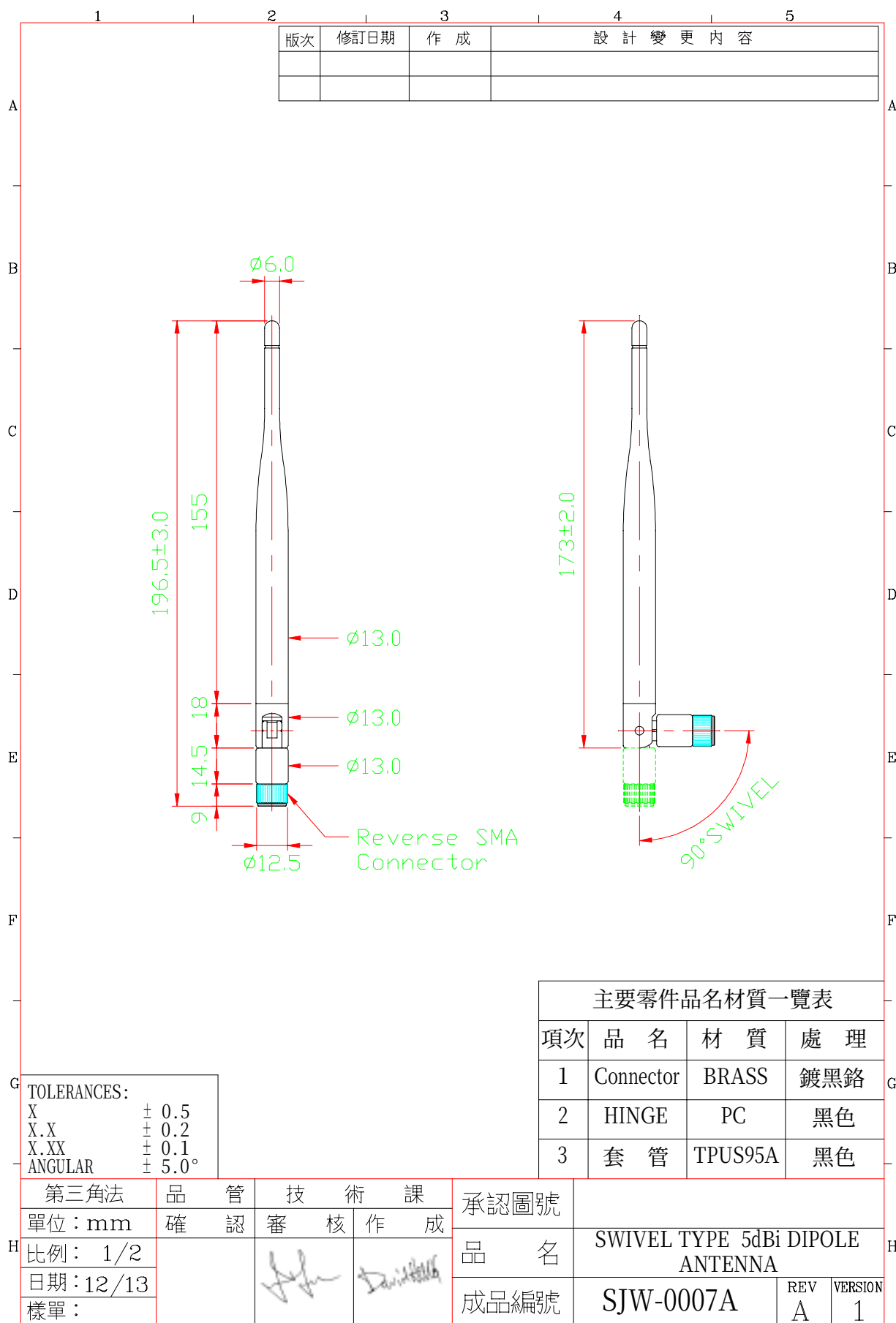
TEL : (02) 22988066 (5 LINE) FAX : (02)22981102

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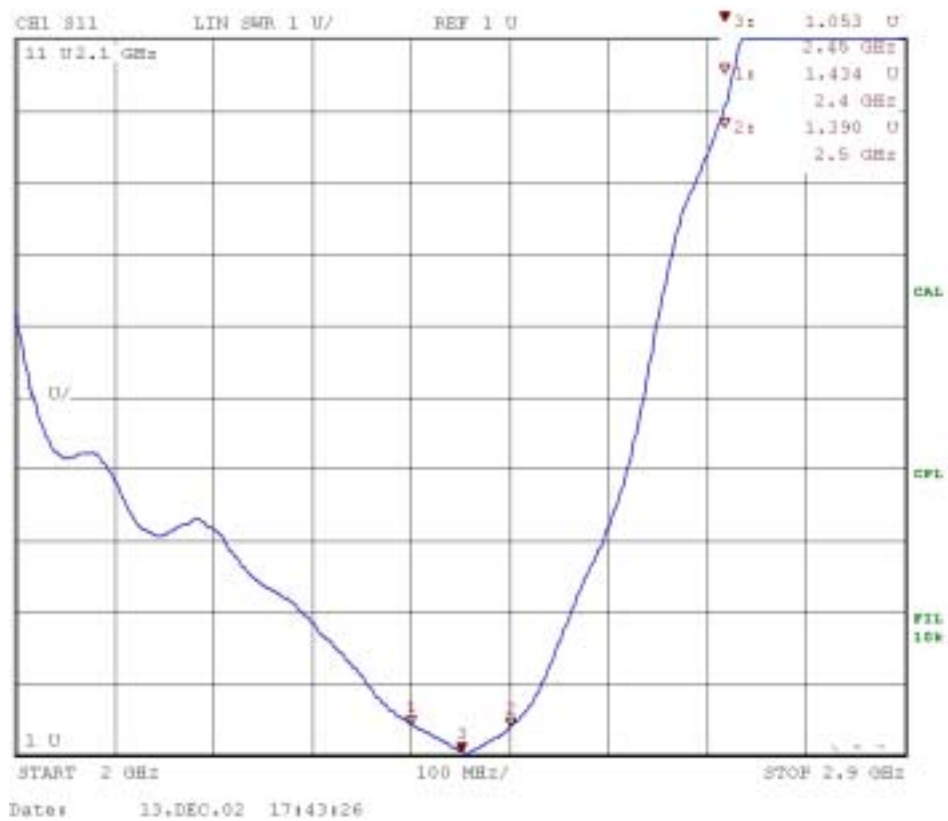
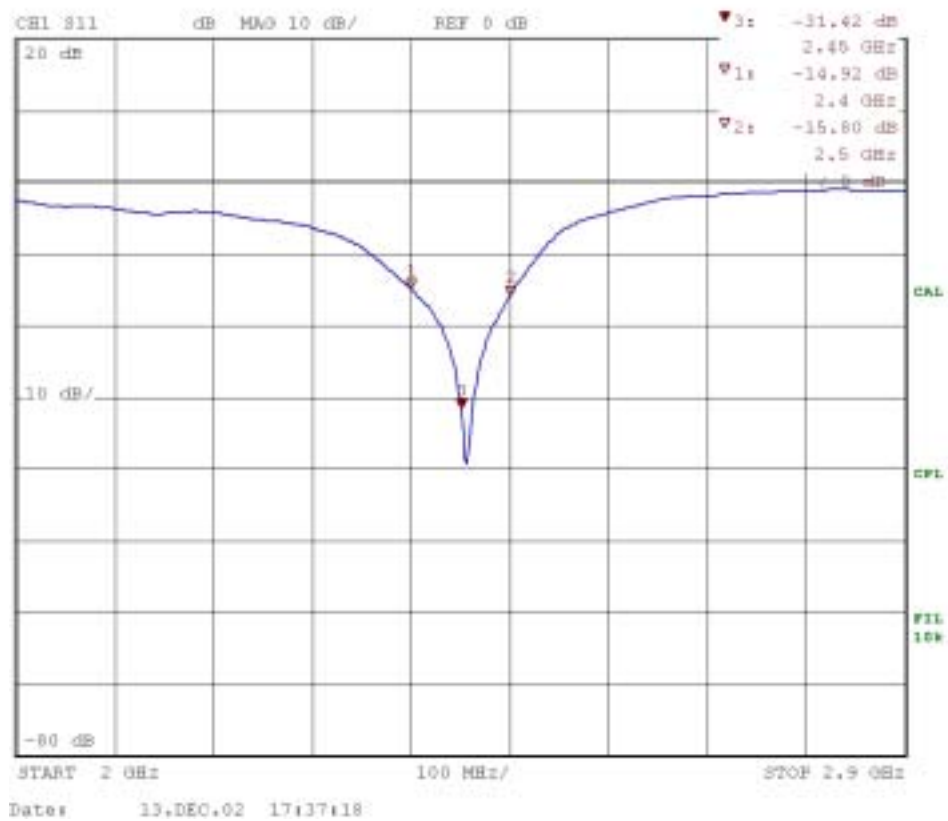
SPECIFICATION

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°C~+65°C
15. STORAGE TEMPERATURE	: -30°C~+75°C



萬旭電業股份有限公司

文件編號：FMT-0513-A1



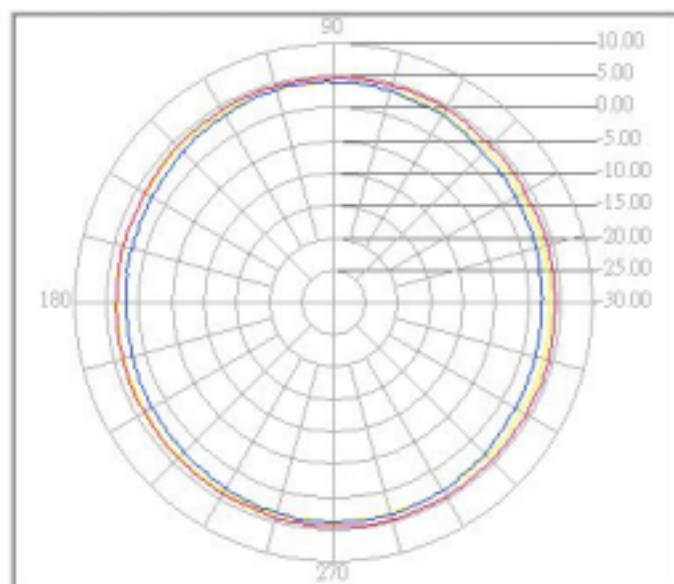


萬旭電業股份有限公司

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

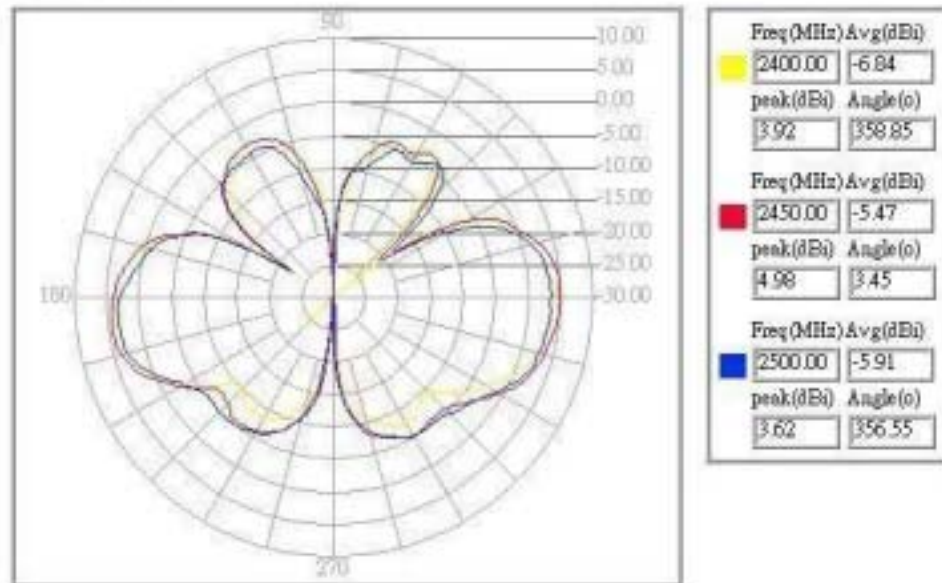


萬旭電業股份有限公司

Model No: 5dBi-01

Antenna Position: Horizontal

Test Mode: 5dBi



Test engineer: David Kell

Test date: 2002/10/23 at 上午 10:50

徐素君

編號：M30-068++-000

品名 / 型號： C068-510195-A 2.4G SMA ANTENNA		
料 號：M30-068++-000 徐素君		
申請日期：91/10/28	申請部門：Gateway System	
製造(代理)商：譚裕	主管： 陳鴻麟	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		
☐ 客戶之環保要求 ☒ NA ☐ 其它 _____		
樣品產生來源：1. ☒ 研發階段 2. ☐ 設計變更 3. ☐ Second Source 4. ☐ 已量產，補確認 5. ☐ _____		
測試結果：		
☒ 電 子： Test OK !		測試人： 陳志偉
☐ 機 構：		測試人：
☐ 電 源：		測試人：
☐ 軟 體：		測試人：
☐ 其 他：		測試人：
關鍵特性： N/A 		
核准： 陳鴻麟	承辦： 徐素君	



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	☒ 圖面【 ☐ 樣品 ☐ 其他【		
供應廠商	☒ 製造商 ☐ 代理商	廠商名稱	譚裕
樣品來源	☒ 研發階段 ☐ 設計變更 ☐ 第二來源 ☐ 補確認（已量產） ☐ _____		
備註欄： TEST OK !			
☐ 客戶之環保要求 ☒ NA ☐ 其它 _____			
注意事項（關鍵特性）： N/A			



核准：

製表： 陳志偉

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

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

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

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台樺電業製品廠

Address: Pak Ho District, Hou Street Town,

Dong Guan City, Guangdong, China

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Fax: + 86-769-5599376

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

上海華裕電子有限公司

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Pu Country Shanghai, China

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Fax: + 86-21-59741347



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RF Antenna Cable Assembly

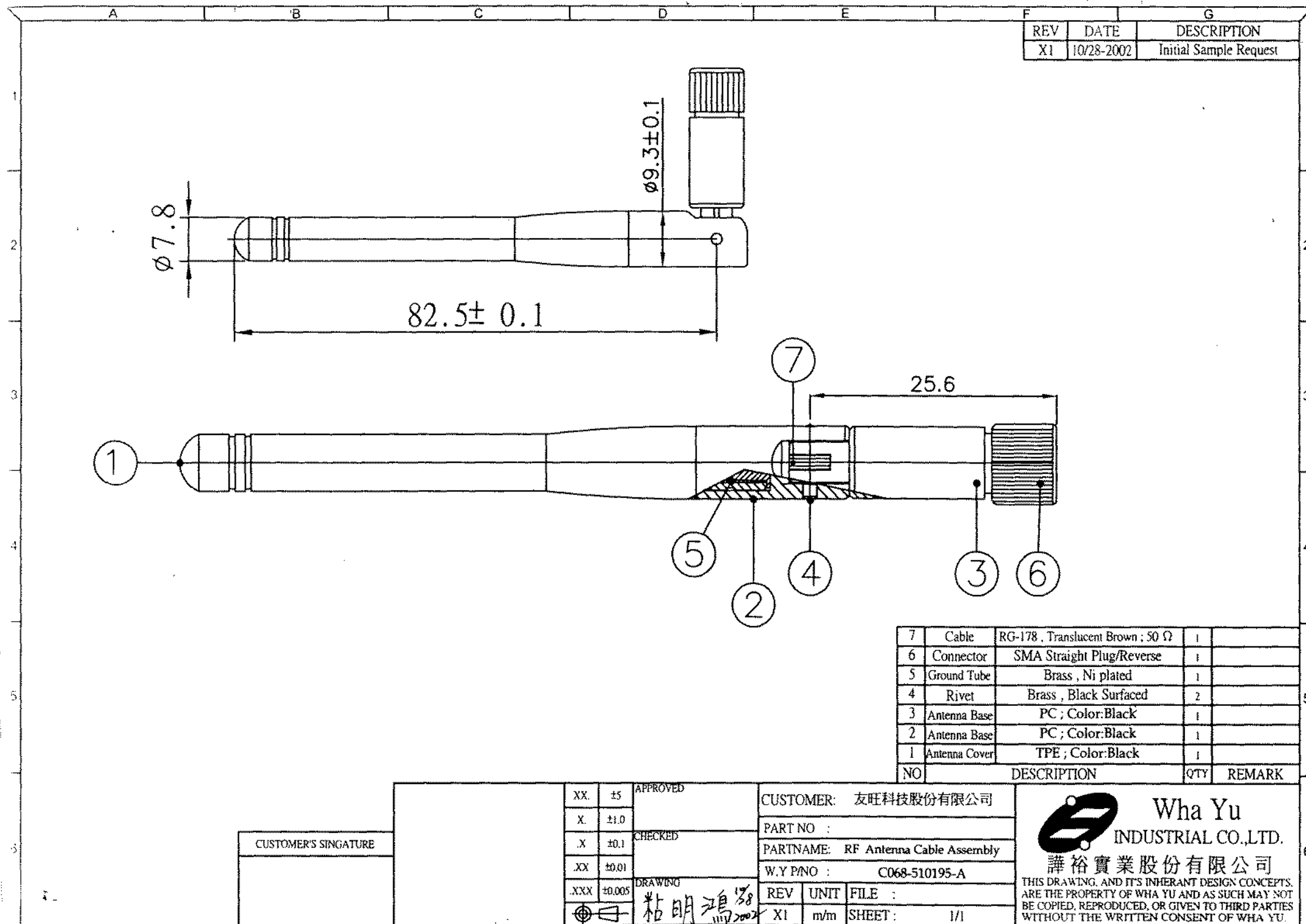
Specification

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

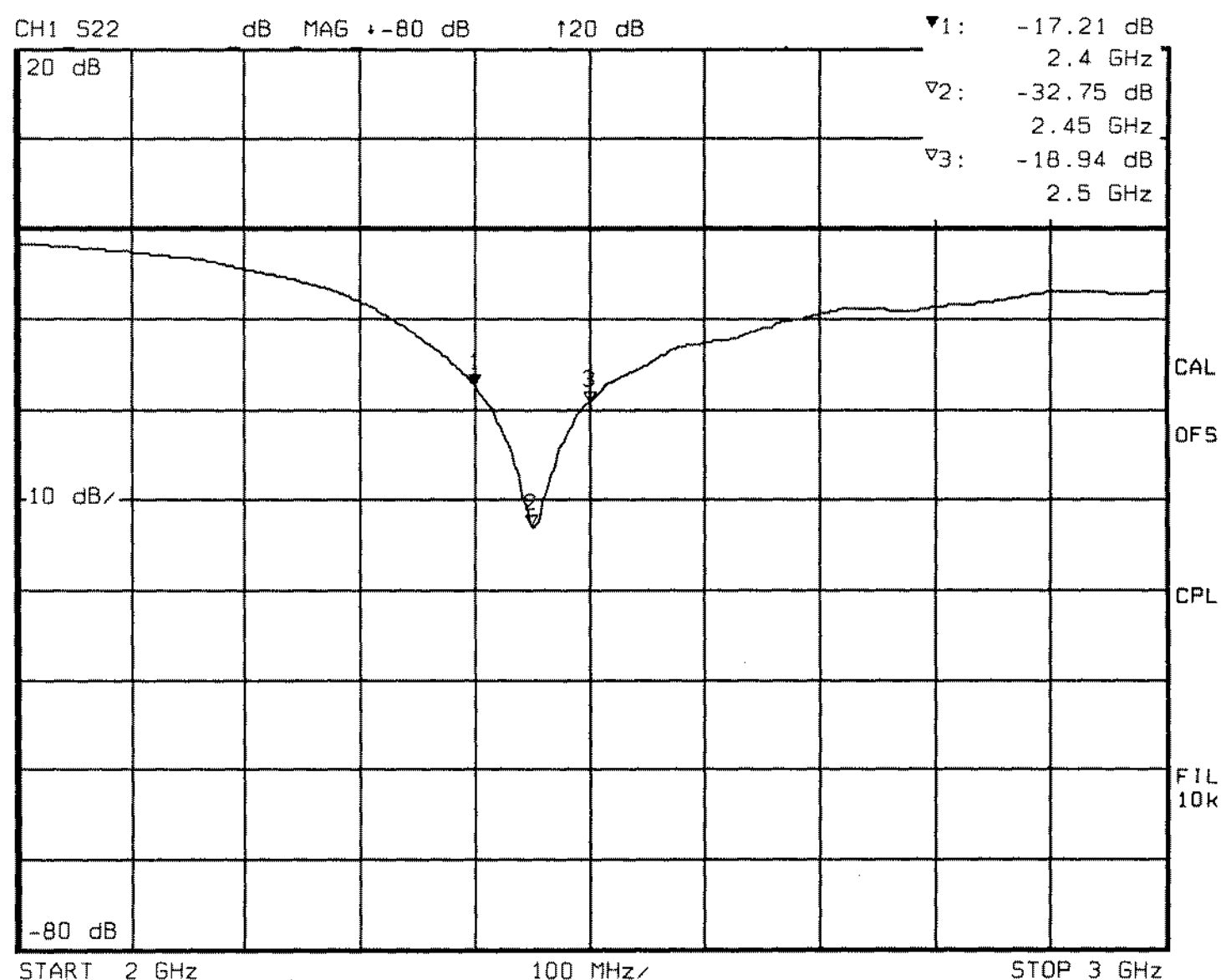
2. Physical Properties :

- 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°C ~ +65°C
- 2.6 Storage Temp.-30°C ~ +75°C
- 2.7 ColorBlack



RF Antenna Cable Assembly

Return Loss



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

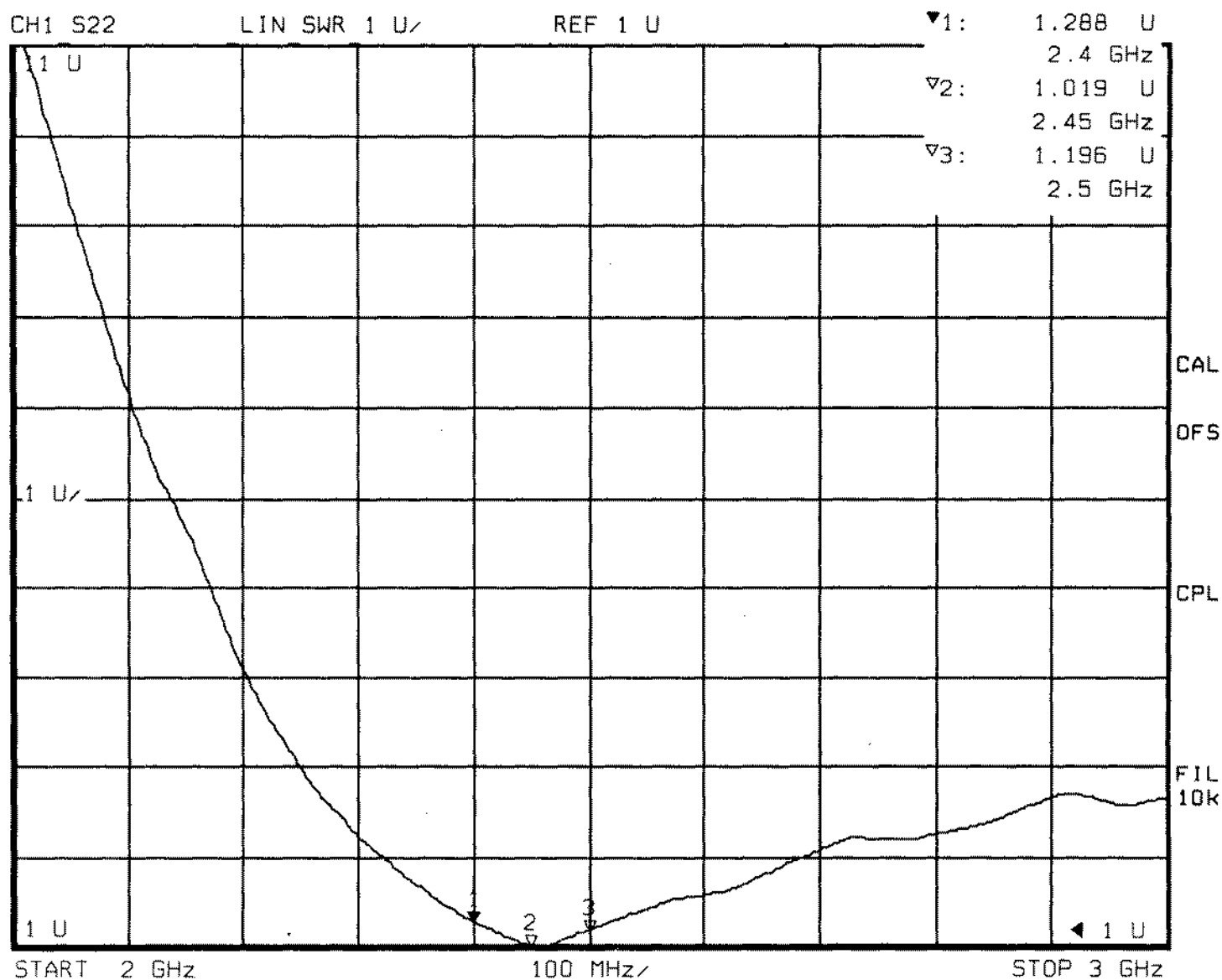


華裕實業股份有限公司

WHA YU INDUSTRIAL CO., LTD

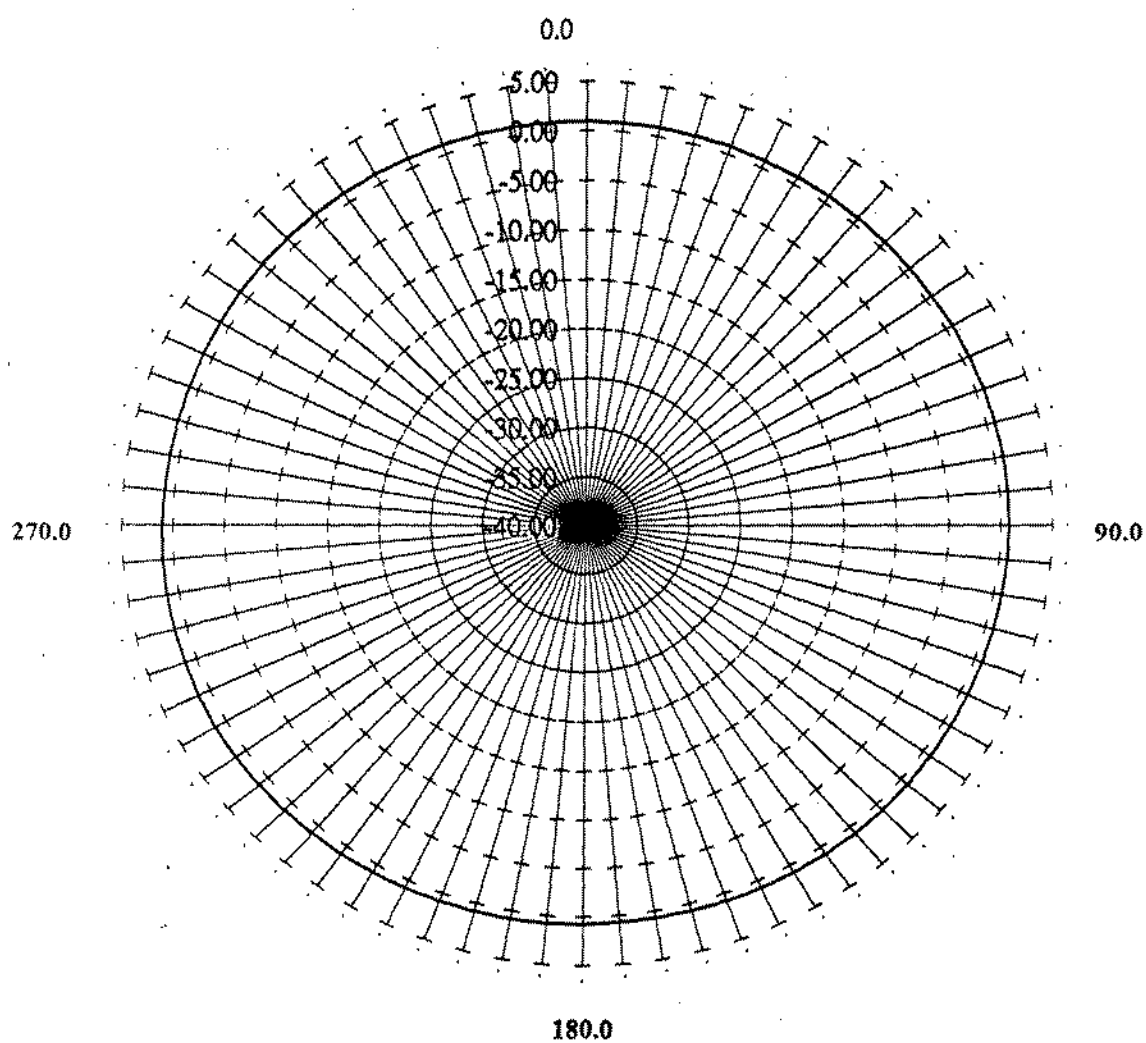
RF Antenna Cable Assembly

VSWR

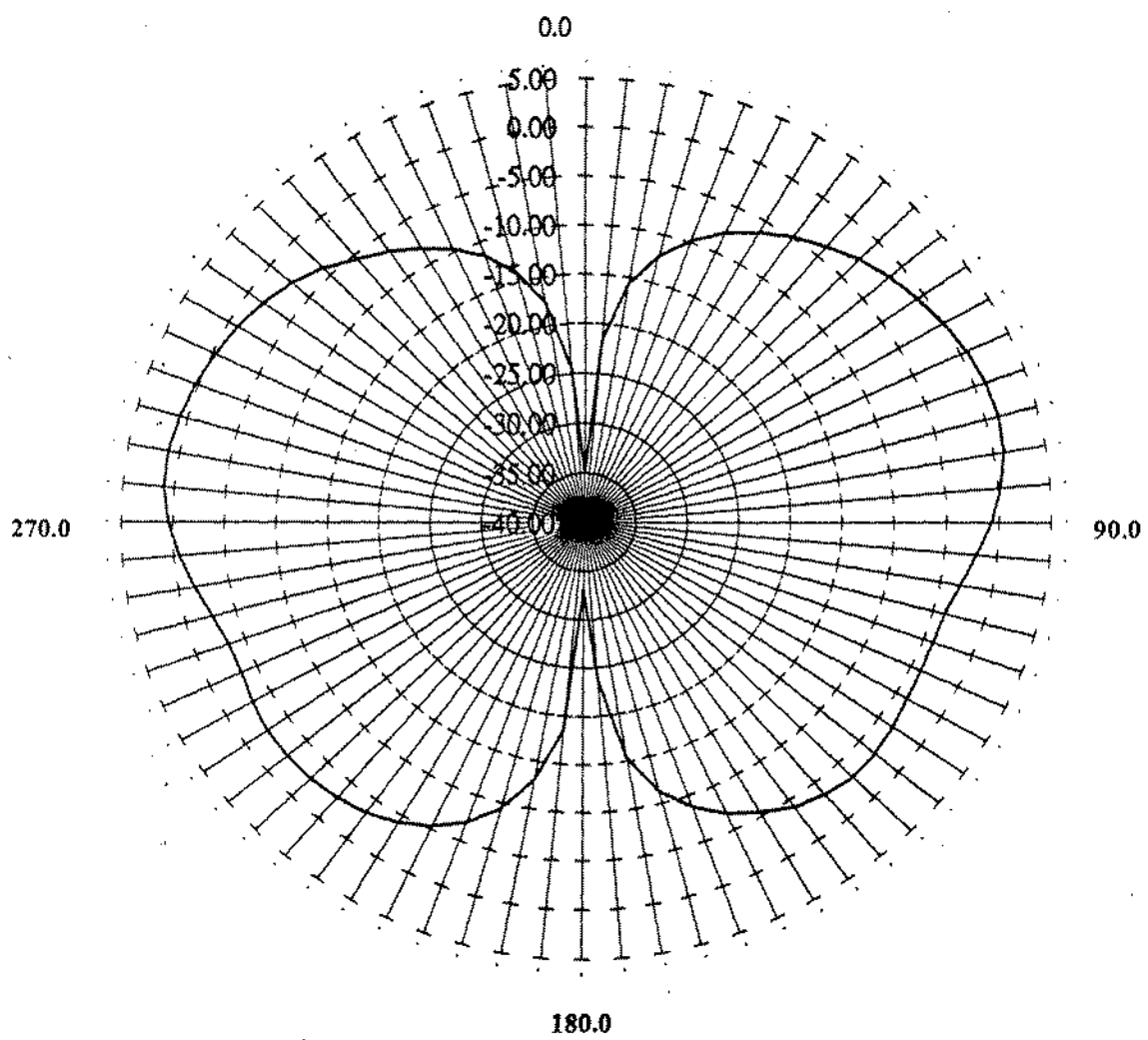


Date: 28.OCT.02 10:24:51

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"

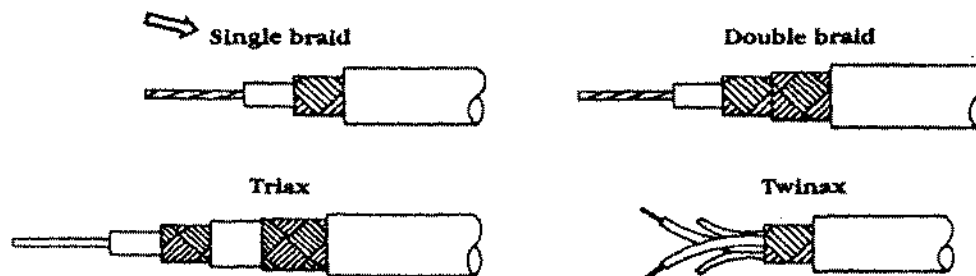
2. Physical Properties :

- 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

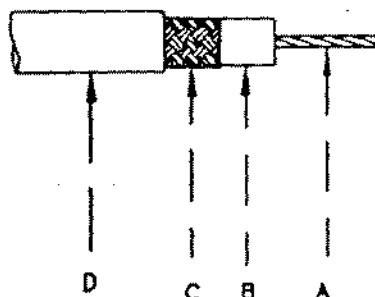
Harbour also manufactures PTFE tape wrapped cables to a previous revision of the MIL-C-17 specification. These constructions can withstand operating temperatures up to 250° C. versus 200° C. for FEP jacketed cables. Also, PTFE tape wrapped cables are generally more flexible than their FEP jacketed counterparts.

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.



Rev	Change	Date



Construction:

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

Electricals:

Impedance: 50 $\pm$ 2 Ohms
Capacitance: 32 pF/ft Max.
Velocity of Prop.: 70% Nom.
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		Approved By: TLT/Amn
Part Number: TBD		Rev: Sheet 1 of 1
		Drawing Number: 121701_1

MIL-C-17 Type Coaxial Cable, QPL approved

Physical Characteristics

M17 Number	Center Conductor	Dielectric	O.D.	Shield	Jacket	Overall O.D.	Operating Temp °C	Weight (lbs./MFT)	Comments
M17/60-RG142	.037 " SCCS	PTFE	.116 "	SPC(2)	FEP	.195 "	-55+200	43.0	
M17/93-RG178	.0120 " (7/.004 ") SCCS	PTFE	.033 "	SPC	FEP	.071 "	-55+200	6.3	
M17/94-RG179	.0120 " (7/.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 " (7/.0067 ") SCCS	PTFE	.060 "	SPC	FEP	.098 "	-55+200	12.2	
M17/127-RG393	.094 " (7/.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 " (7/.004 ") SCCS	PTFE	.033 "	SPC(2)	FEP(2)	.116 "	-55+200	15.0	Triaxial M17/93-RG178
M17/152-00001	.0201 " (7/.0067 ") SCCS	PTFE	.060 "	SPC(2)	FEP	.114 "	-55+200	18.5	Double Shielded RG316

RG Type Coaxial Cable, Non-QPL

RG174 /U	.0120 " (7/.0067 ") TPC	PE	.060 "	TPC	PVC	.110 "	-40+ 85	9.0	
RG213 /U	.089 " (7/.0296 ") BC	PE	.285 "	BC	PVC	.405 "	-40+ 80	111.0	
RG214 /U	.089 " (7/.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 " (7/.004 ") TPC	PE irradi.	.033 "	TPC	PVC	.071 "	-40+105	5.8	Flexible, 105°C. rated
RG178 /U	.0120 " (7/.004 ") SPC	FEP	.033 "	SPC	FEP	.071 "	-55+200	6.3	
RG179 B/U	.0120 " (7/.004 ") SPC	FEP	.063 "	SPC	FEP	.100 "	-55+200	10.8	
RG316 /U	.0201 " (7/.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 " (7/.004 ") SCCS	PTFE	.063 "	SPC	PTFE	.100 "	-55+250	9.0	Flexible, 250°C. rated
RG188 A/U	.0201 " (7/.0067 ") SCCS	PTFE	.060 "	SPC	PTFE	.100 "	-55+250	12.0	Flexible, 250°C. rated
RG196 A/U	.0120 " (7/.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.

INTERNET - <http://www.commate.com.tw>

E-MAIL: raison@commate.com.tw

Commate International, Canada - 49 Thatcher's Millway, Markham, Ontario L3P 3T2/FAX: +1(905)472-2487

Commate International, Taiwan - 2-2 Alley 3, Lane 387 Nei-Hu Road Sec. 1, Taipei / TEL: +886(2) 2659-0060 / FAX: +886(2) 2797-3715

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	$5 \cdot 10^{14}$	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
$\times 10^{14}$	10	\	\	3.8	\	310
$\times 10^{14}$	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

Arnitel® EL630/EM630**2.8.31 General:**

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

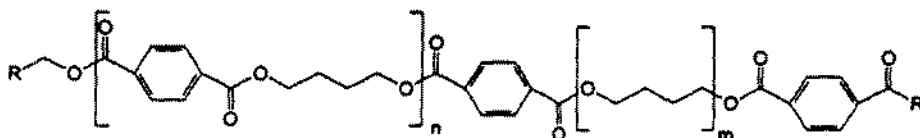


Figure 2.9: Chemical structure of Arnitel EL630/EM630.

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



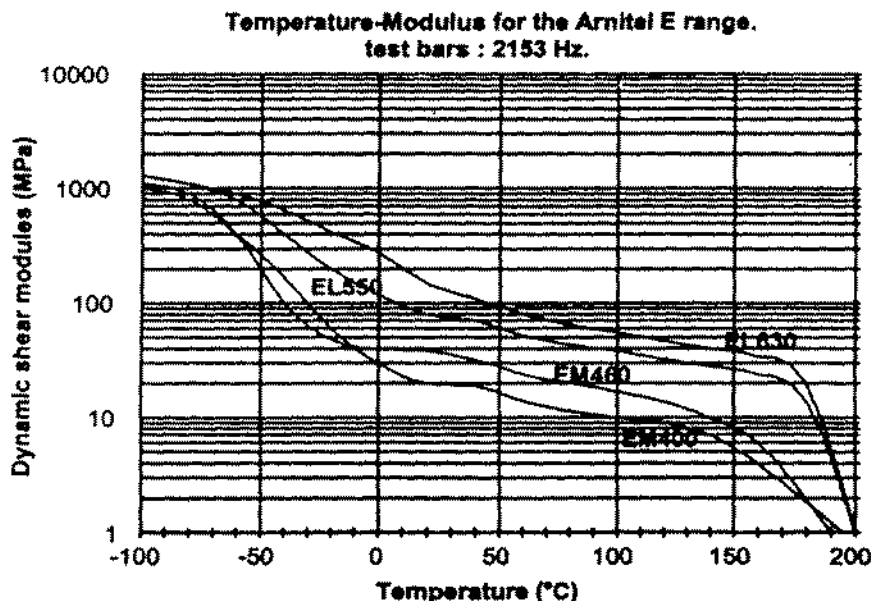
Figure 2.10: Simplified structure of Arnitel EL630/EM630.

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

2.8.32 Thermal properties:

- **Modulus-temperature behaviour:**

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



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

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 $140 \cdot 10^{-4} \mu\text{m/m.K}$.

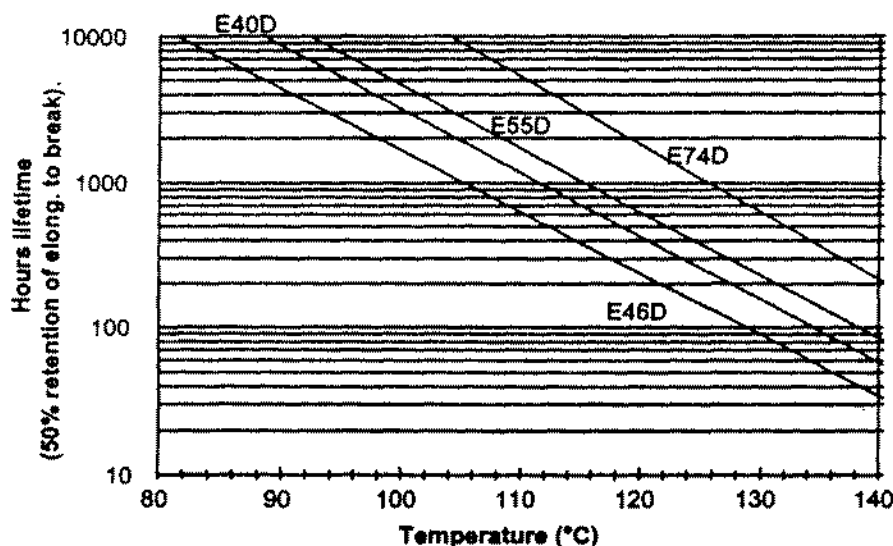
- **Heat aging:**

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/cm^3 according ISO 1183.

Due to the polyester nature of these materials it is of major importance to store the material dry prior to processing. Materials packaged in sealed packaging should have a moisture content lower then 500 ppm. The polymer will contain 0.12% moisture in 50% RH and 0.58% water after saturation in water. Both numbers are in equilibrium.

If samples have become wet during storage a drying step of 24 hours 120°C (or 6 hours 140°C) prior to use will prevent degradation of the material during processing combined with an eventual loss of properties. The air or nitrogen will have to have a dew point of at least -30°C.

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

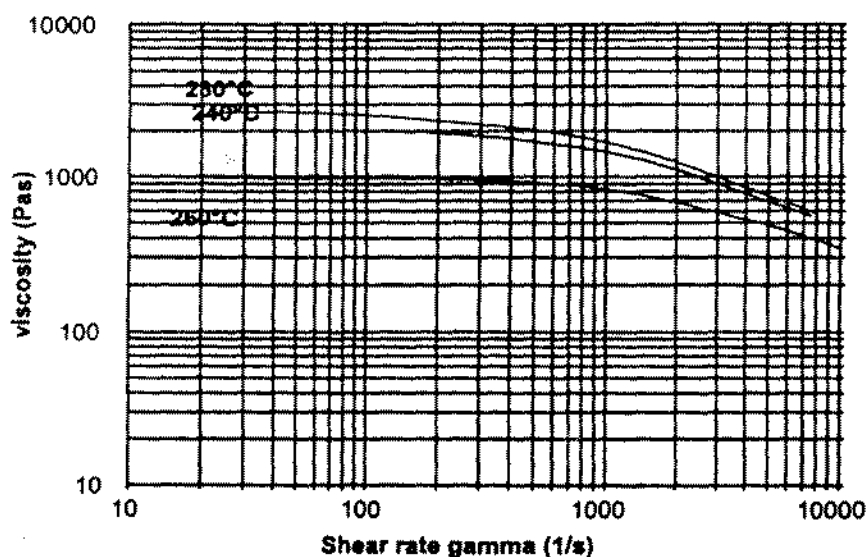
All temperatures are in °C.

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

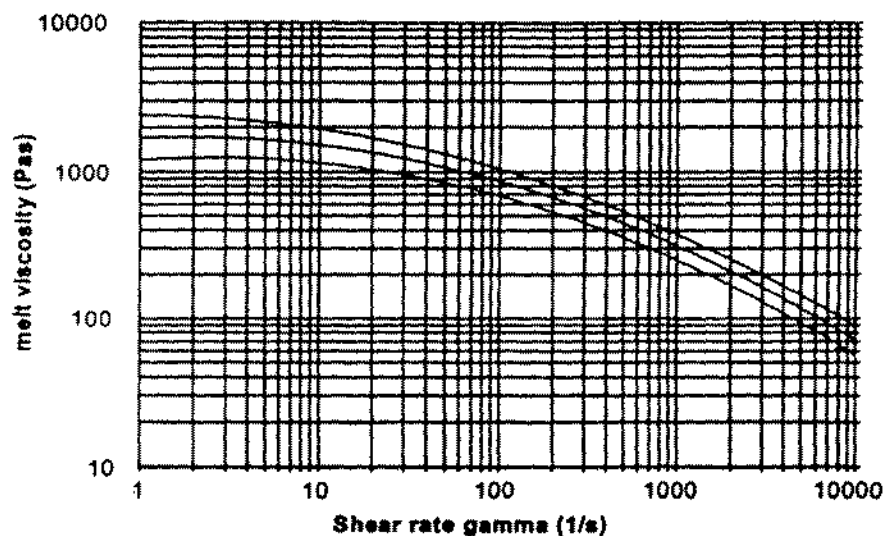
• **Rheology:**

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.



Amitel® EL630/EM630

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

Graph 2.80 and 2.81: Temperature dependency of the melt viscosity for Amitel 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 Amitel EL630/EM630.

• Use of regrind:

Amitel 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 Amitel EL630 or Amitel 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 Amitel® 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®

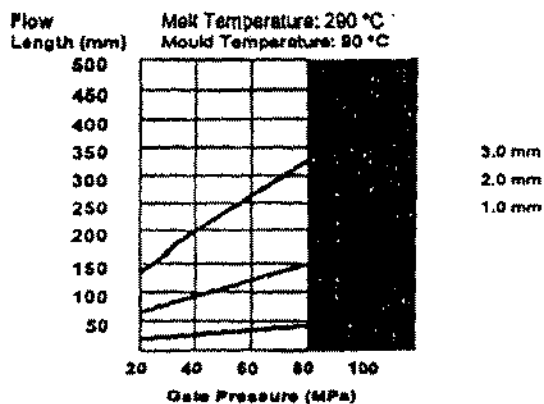
Polycarbonate Resins

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 MUB-layer module for radial flow.

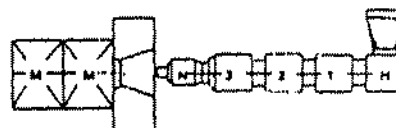
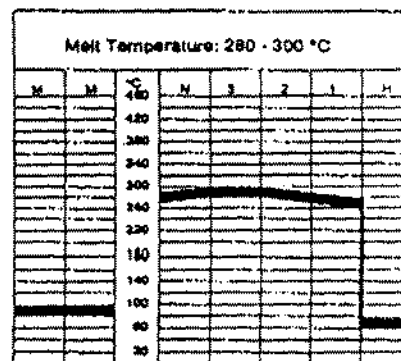


Technical support is recommended. Contact your local representative.

Moldflow is a registered trademark of Moldflow.

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

PROCESSING CONDITIONS



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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Source ERUS, Updated 22 Dec 88, Page 1 >>>

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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	85	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		85	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/Be, 0.45 MPa edgew. 120°10°4/s=100 mm		139	°C	ISO 75/B9e
HDT/Ae, 1.8 MPa edgew. 120°10°4/s=100 mm		122	°C	ISO 75/A9e
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	PASSES	-	IEC 335-1
Ball Pressure Test	125 °C ± 2 °C	PASSES	-	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, Passes 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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Source ERUS. Updated 22 Dec 88, Page 2 >>>

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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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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).

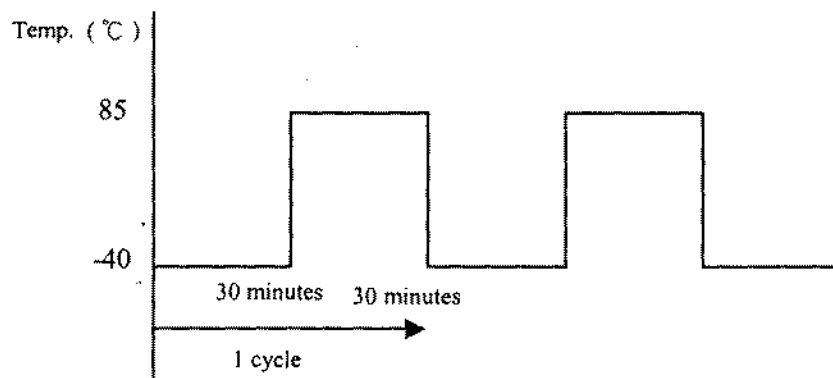
In case of eye contact, bathe immediately with water and seek immediate medical attention.

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℃ ~ 85℃
- 3.循環次數： 20次
- 4.規範值： 7 Kg Minium



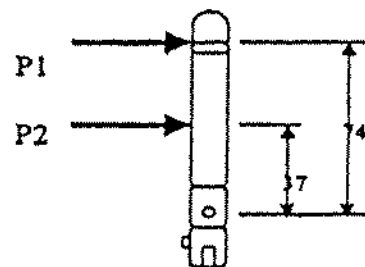
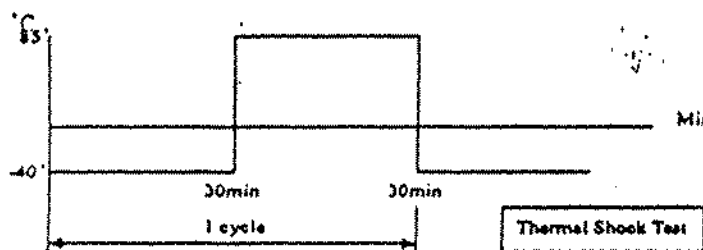
Sample	規範值	測試結果
1	7 Kg	>7Kg
2		>7Kg
3		>7Kg
4		>7Kg
5		>7Kg
6		>7Kg
7		>7Kg
8		>7Kg
9		>7Kg
10		>7Kg

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.



Bending Test Structure

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

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：Rich	申請人：顏佑任
適用機種、PC板名：WP2000		
規格(材質、尺寸、公差、圖面...)：		
☐ 客戶之環保要求 ☒ NA ☐ 其它 _____		
樣品產生來源：1. ☒ 研發階段 2. ☐ 設計變更 3. ☐ Second Source 4. ☐ 已量產，補確認 5. ☐ _____		
測試結果：on board Test ok		
☒ 電子：		測試人：顏佑任
☐ 機構：		測試人：
☐ 電源：		測試人：
☐ 軟體：		測試人：
☐ 其他：		測試人：
關鍵特性：NA 		
核准：Rich	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	☒ 圖面【 】 ☐ 樣品 ☐ 其他【 】		
供應廠商	☒ 製造商	☐ 代理商	廠商名稱 <u>瑞旺</u>
樣品來源	☒ 研發階段 ☐ 設計變更 ☐ 第二來源 ☐ 補確認（已量產） ☐ _____		
備註欄：			
☐ 客戶之環保要求 ☒ NA ☐ 其它 _____			
注意事項（關鍵特性）： NA			



核准：Richell

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 1011-094-D8

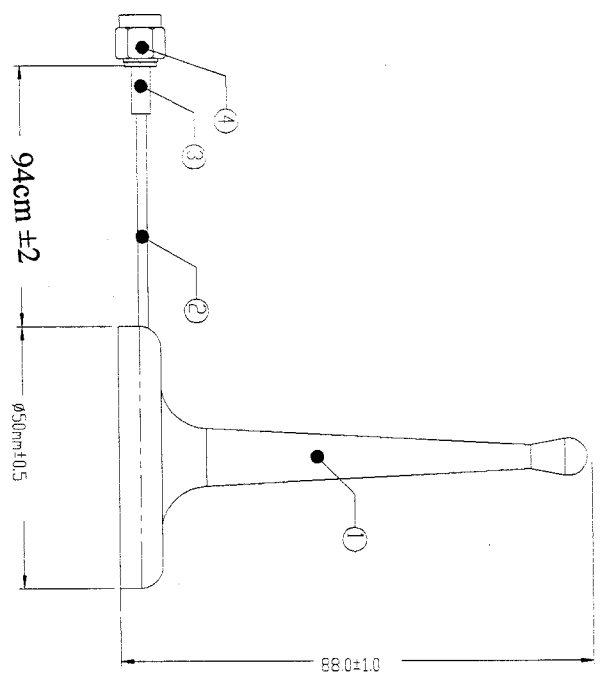
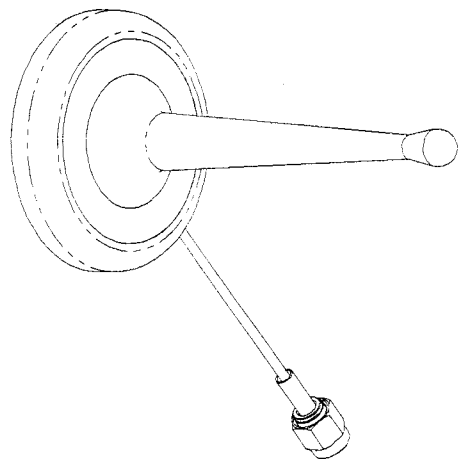
DATE 2002.10.28

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

9 2 1/2 ~ 2 2



ELECTRICAL PERFORMANCE :

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

4	RP-SMA	BRASS	GOLD FALSH
3	HEAT SHRINK TUB		NONE
2	RG-178		NONE
1	BODY	TPR	NONE

ITEM DESCRIPTION MATERIALS FINISHED

REVISIONS		REMARKS		TITLE		2.4~2.5GHz RF Antenna		SHEET 1 OF 1		SCALE		INPUT OUTPUT	
B	NEW RELEASE			Yang	04/08/2002								
A	NEW RELEASE			ZEKE	15/03/2002								
REV.	DESCRIPTION	ECN	DRAWN	DATE									

w111-094-D8

w111-094-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

IO ANTENNA PATTEN

ANTENNA TEST NO. W111-094-D8

TEST DATE:2002/10/18

TEST FREQUENCY:2450MHz

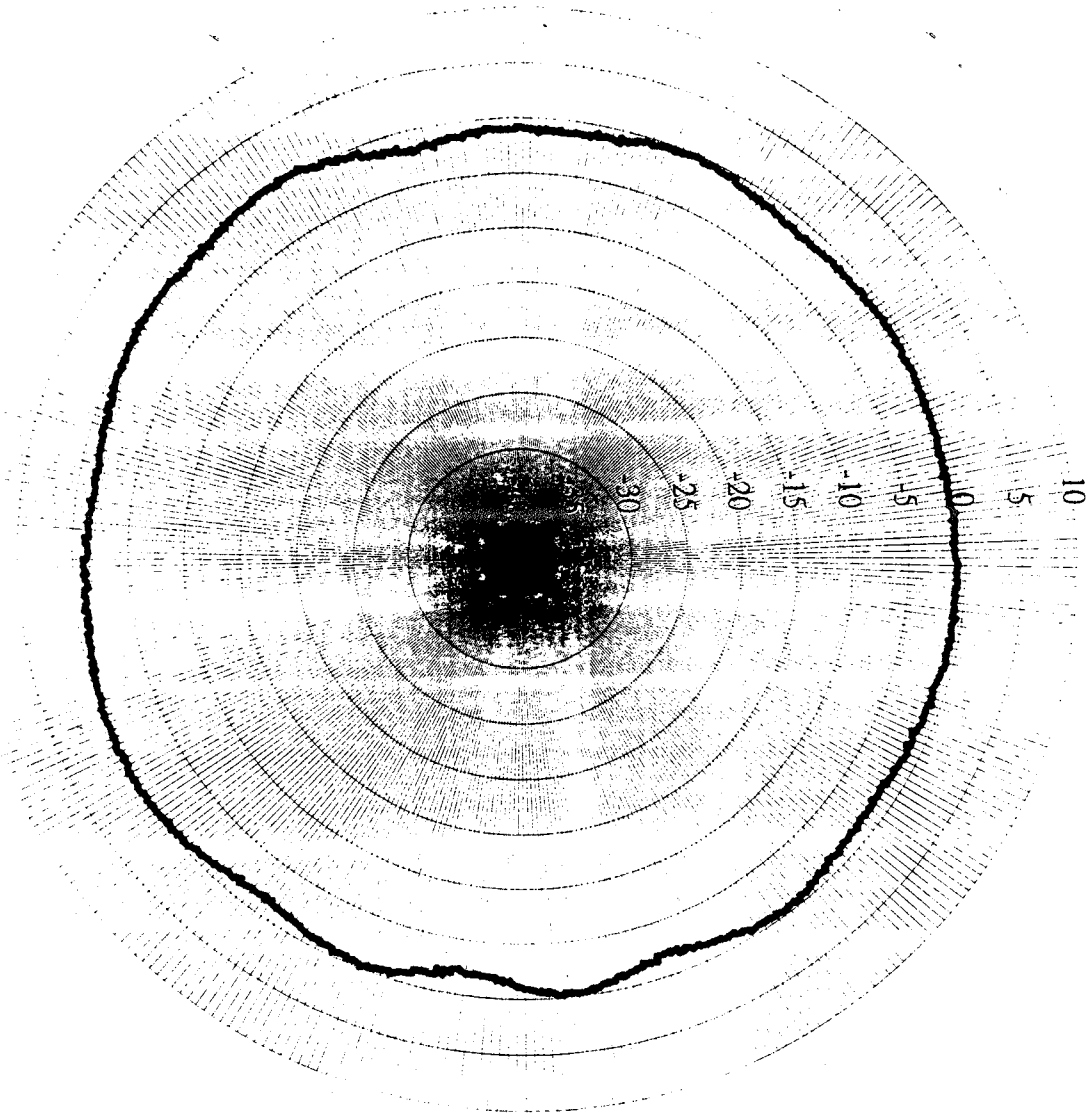
TEST POLARIZATION:VERTICAL
(H-PLANE)

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

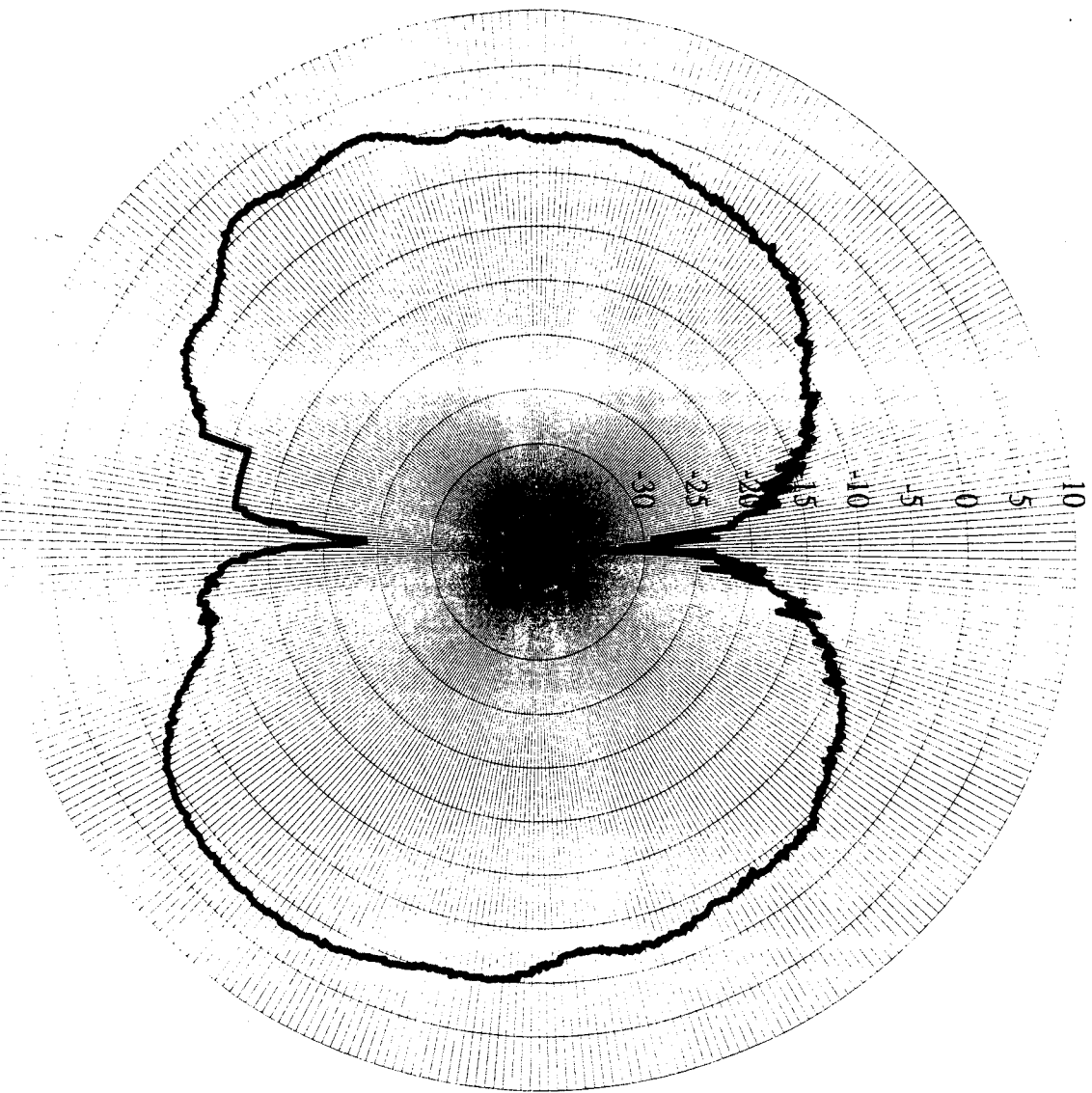
TEST POLARIZATION:HORIZONTAL
(E-PLANE)

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:

Page 1

SWEEP DATA

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

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

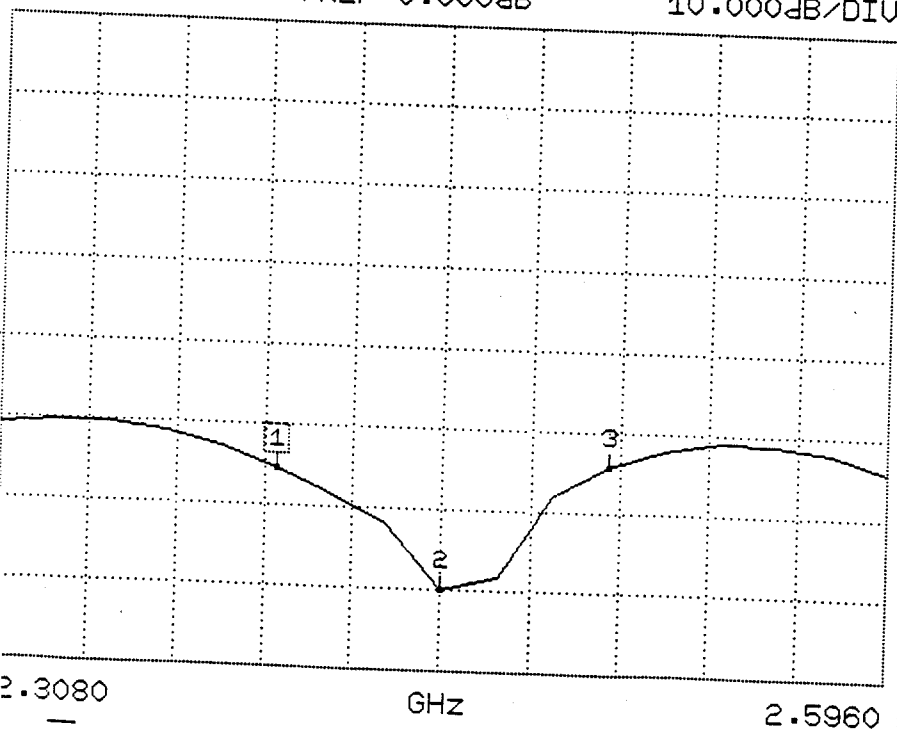
ERROR CORR: REFL ONLY
AVERAGING: 1 PTS
IF BNDWDTH: REDUCED

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 :

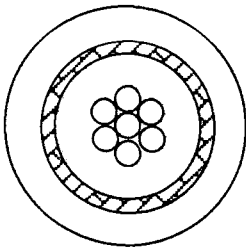
MAKER :

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 :

REVISD DATE :
APPROVAL :

PAGE : 1