

Measurement of MPE

1. Foreword

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *Anechoic chamber*. The *maximum total power to the antenna* is to be recorded. By adopting the ***Friis Transmission Formula*** and the *power gain of the antenna*, we can find the distance right away from the product, where the limit of the MPE is.

2. Description of EUT

Granted FCC ID	: KA2DFM-562B
Product name	: Bluetooth Modem
Model name	: DFM-562BT
Classification	: Mobile Device (i) Under normal use condition, the antenna is at least 20cm away from the user; (ii) Warning statement for keeping 20cm separation distance and the prohibition of operating next to the person has been printed in the user's manual
Frequency Range	: 2.400 GHz ~ 2.4835GHz
Supported Channel	: 80 Channel
Channel Spacing	: 1MHz
Modulation Skill	: GFSK
Power Type	: Powered by AC to AC Adaptor Model: MW41-0900800A I/P: AC 120V, 60Hz O/P: AC 9V, 800mA

3. Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	100	6
3.0-30	1842/f	4.89/f	900/f ²	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	100	30
1.34-30	824/f	2.19/f	180/f ²	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

[The EUT is tested in transmit and receive modes and in the first, middle and the last channel separately. The following shows only our observation have the greatest emissions.]

According to OET BULLETIN 56 Fourth Edition/August 1999, Equation for Predicting RF Fields:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4pR^2} = \frac{0.854 \times 1.897}{4p(20)^2} = 3.223 \times 10^{-4} \text{ mW / cm}^2$$

$$\text{Estimated safe separation: } R = \sqrt{\frac{PG}{4p}} = \sqrt{\frac{0.854 \times 1.897}{4p}} = 0.359 \text{ cm}$$

Remarks: "The safe estimated separation that the user must maintain from the antenna is at least 0.359 cm."

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

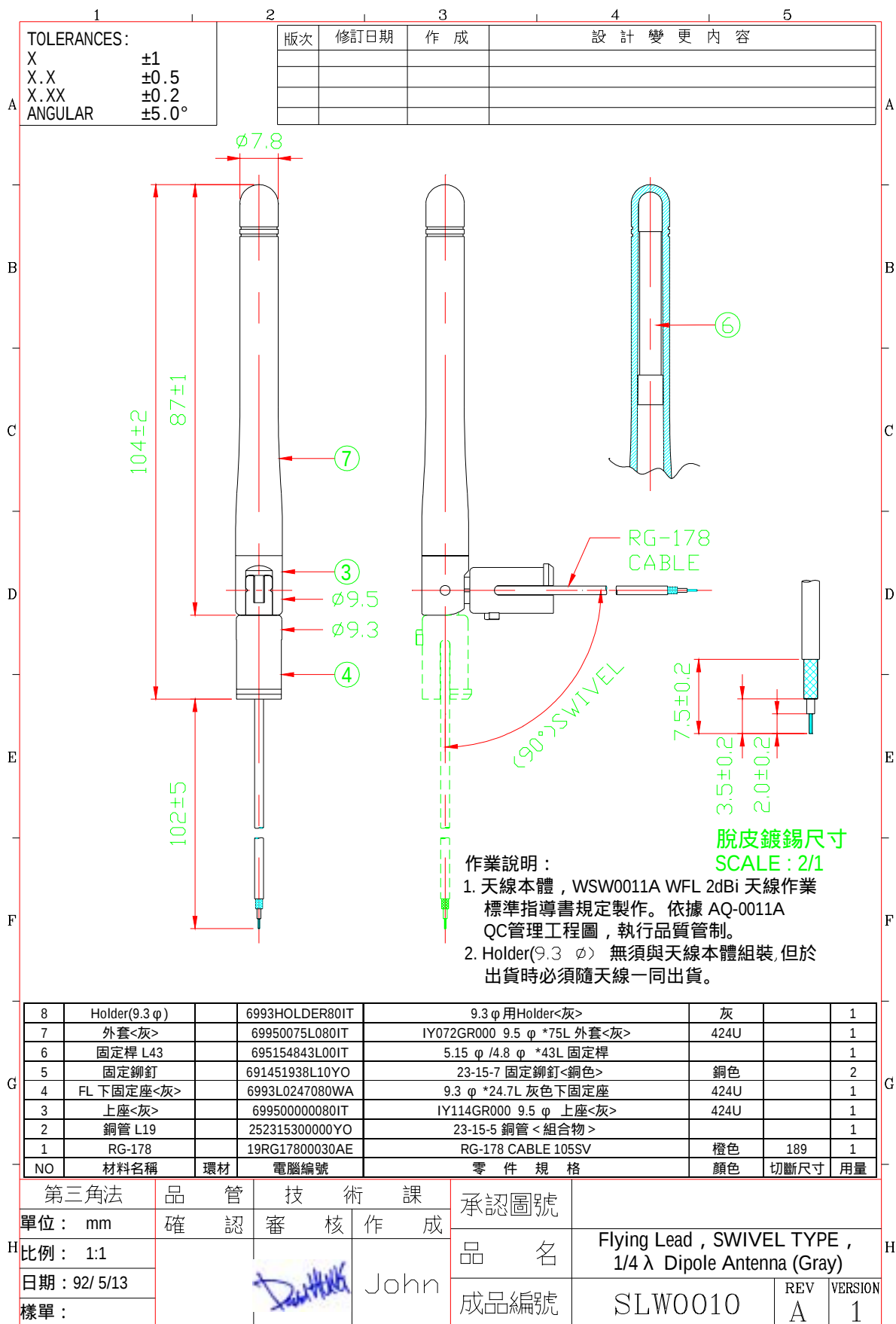
The Numeric gain G of antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1} (\text{dBi antenna gain} / 10)$$

$$G = \text{Log}^{-1} (2.78 / 10) = 1.897$$

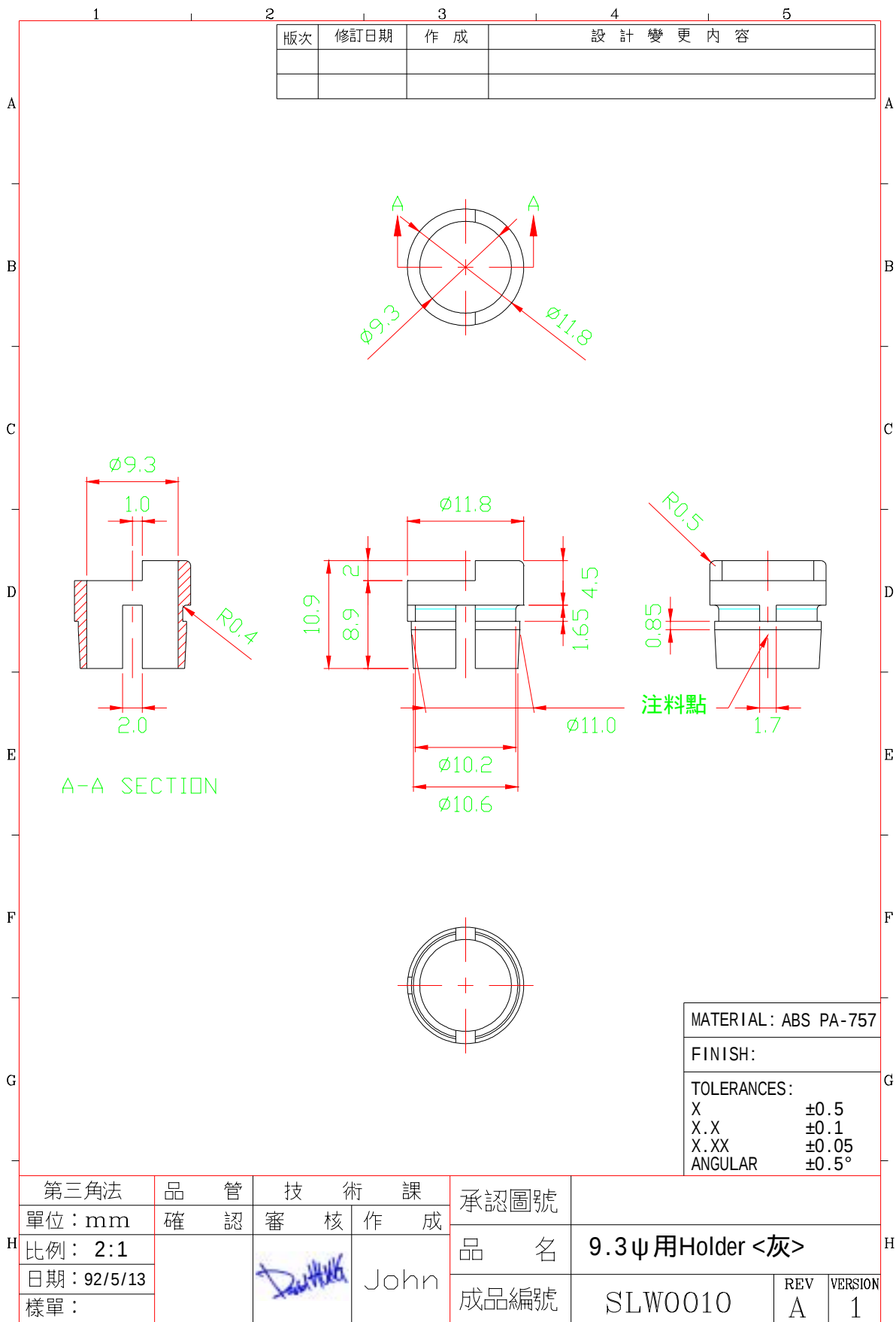
SPECIFICATION

- | | |
|-------------------------------|--|
| 1. Description | : Flying Lead Swivel Type
1/4λ Dipole Antenna (Gray) |
| 2. Customer | : 宏傳電子股份有限公司 |
| 3. Model No. | : WFL002 |
| 4. Part No. | : SLW0010A |
| 5. Standard | : IEEE 802.11b 11Mbps Wireless LAN |
| 6. Antenna Profile | : 108 mm length (see Drawing) |
| 7. Color | : Gray(424U) |
| 8. Electrical Characteristics | |
| Operating Frequency | : 2.4~2.5Ghz |
| Antenna Type | : 1/4λ Dipole Sleeve |
| Polarization Type | : Linear |
| Type of Radiation | : Toroidal |
| Antenna Gain | : 2.78 dBi Typical |
| Impedance | : 50 Ohm nominal |
| V.S.W.R. | : 2.0:1 Max. |
| 9. Mechanical Characteristics | |
| Action | : Swivel Type |
| Holder | : With |
| Connector | : N/A |
| Core | : N/A |
| 10. Raw Material | |
| Coaxial Cable | : MIL-C-17 RG-178 B/U |
| Housing | : TPU |
| Hinge | : Polycarbonate |



萬旭電業股份有限公司

文件編號：FMT-0513-B7



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Coaxial Cable Data Sheet
RG-178

SPECIFICATION FOR APPROVAL

DOCUMENT: A30178B001

STYLE : 200 30V
RG-178B/U

SIZE: 7/0.102 SCCS

RECOGNIZED:

WONDERFUL HI-TECH CO.,LTD

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

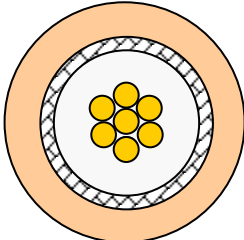
FACTORY : 17 PEI YUAN ROAD,
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TAIWAN, R.O.C.

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

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

WONDERFUL HI-TECH CO., LTD

SPECIFICATION

STYLE	200 30V COAXIAL	DOCUMENT NO : A30178B001
SIZE	RG-178B/U	ESTABLISHED DATE: 2003/02/13
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	----- Brown
Marking		
Drawing		

AK001/210X297/1.0

PAGE : 1

EDITION : 1.1

REVISED DATE :

MAKER : C.Y.CHEN

CONFIRM : S.N.WONG

APPROVAL : W.J.WANG

WONDERFUL HI-TECH CO., LTD

SPECIFICATION

Electrical & Physical Properties							
Item				RG-178B/U			
Rating Temp Voltage				200 30V			
Conductor Resistance				838 OHM/KM/20 MAX.			
Insulation Resistance				3000 MEGA OHM/KM MIN.			
Dielectric Strength				AC 1.0 KV/Minute			
Spark Test				2.0 KV			
Insulation	Unaged	Tensile Strength		2500 PSI MIN.(1.76 Kg / m mm ²)			
		Elongation		200% MIN.			
	Aged	Tensile Strength		UNAGED MIN 75%(168HRS×232)			
		Elongation		UNAGED MIN 75%(168HRS×232)			
Jacket	Unaged	Tensile Strength		2500 PSI MIN.(1.76 Kg / m mm ²)			
		Elongation		200% MIN.			
	Aged	Tensile Strength		UNAGED MIN.75%(168HRS×232)			
		Elongation		UNAGED MIN.75%(168HRS×232)			
Nom. Impedance				50 Ohms			
Nom. Capacitance				95.8 pF/m			
Nom. Vel. of Prop.				69.5%			
VSWR (0 – 6 GHZ)				UNDER 1.3			
Attenuation (dB/100m)	100MHz	1GHz	1.8GHz	2.4GHz	5.2GHz	6GHz	
	46	155	295	340	505	550	