

Customer

(客戶)

:

立創電子

HF

Part No.

(客戶料號)

:

RoHS

## 承 認 書

### SPECIFICATION FOR APPROVAL

Description

(說明)

:

**Metal Oxide Film Resistors**

(氧化金屬皮膜電阻器)

Futaba Series

(雙羽系列)

:

**RS Series (Halogen-Free)**

Futaba Part No.

(雙羽料號)

:

**see RECOGNITION 2.**

Part No.

(客戶料號)

:

台灣雙羽電機股份有限公司

雙羽電子(深圳)有限公司

雙羽電子(蘇州)有限公司

湖南富羽電子科技有限公司

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Approval Signatures/Seals





Product Specification (產品型別) : **RS series**

REV

**S1-A(V1297)**

Items (項次)

Contents (內容)

1.Application  
(適用範圍)

This specification covers Fixed Metal Oxide Film Resistors ; RS type.  
(本規範適用於固定型氧化金屬皮膜電阻,型別為 RS)

Types are designated as follows (型別代碼說明如下):

2. Type  
Designation  
(型別代碼)

ex. 

<u>RS</u>	<u>S</u>	<u>02</u>	<u>J</u>	<u>5600</u>	<u>A520</u>	<u>NH</u>
Type	Size	Rated Power	Tolerance	Resistance	Taping	Lead Wire
(型別)	(品名)	(額定功率)	(精密度)	(電阻值)	(造型)	(端子線)
(metal oxide)	(Small)	(2W)	(±5%)	(560Ω)	(A52)	(heat plated)
(氧化)	(小型品)					(熱鍍線)

3.Rating

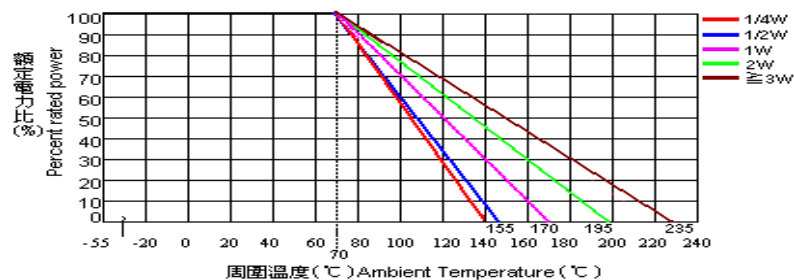
1) Ratings  
(額定值)

Ratings are shown at table 1. Ratings  
(電阻的使用額定值是規定於表-1)

Table 1. Ratings (表-1 額定值)

Items (項次)	Contents (內容)
Type size (型別品名)	<b>RS</b>
Rated wattage (額定功率)	<b>S2W</b>
Maximum operational voltage (最高正常使用電壓)	$\sqrt{PR}$
Maximum overload voltage (最高過負荷電壓)	$2.5*\sqrt{PR}$
Dielectricwithstanding voltage (塗裝絕緣電壓)	<b>350V</b>
Rated ambient temperature (額定環境溫度)	<b>70 °C</b>
Operating temperature range (使用環境的溫度範圍)	<b>see Fig.1 derating curve</b>
Resistance tolerance (電阻值的精密度)	<b>J ( ±5%)</b>

\* Rated wattage is the maximum continuous power applicable at ambient temperature from  $-55\text{ °C} \sim 70\text{ °C}$  (額定功率的定義為當使用環境溫度範圍在 $-55\text{ °C} \sim 70\text{ °C}$ 時, 電阻在連續使用的條件下可承受的最高功率 )



(see Fig.1 derating curve)

Product Specification (產品型別品名) : <b>RS series</b>	<b>REV</b>	<b>S1-A(V1297)</b>
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Items (項次)	Contents (內容)
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2).Rated voltage (額定電壓)

Rated voltage is the D.C voltage at ambient temperature from -55°C to 70°C.  
 Rated voltage shall be determined from the following formula.  
 (額定電壓的定義為：當使用環境溫度範圍在-55°C to 70 °C時,電阻可承受的最高直流電壓.其計算公式如下：)

If Rated voltage is over maximum operational voltage, then rated voltage is equal to maximum operational voltage on table 1. (當根據下列公式計算出的額定電壓高於表 1 的最高正常使用電壓時, 則額定電壓將以 表-1 的最高正常使用電壓為準)

$$V = \sqrt{P(W) \times R(\Omega)}$$

Rated voltage (額定電壓)      rated wattage (額定功率)      nominal resistance (額定電阻值)

4. Nominal resistance (額定阻值)

Nominal resistance are calculated by the following basic values multiplied by 10<sup>-1</sup>, 10<sup>0</sup>, 10<sup>1</sup>, 10<sup>2</sup>, 10<sup>3</sup>, 10<sup>4</sup>, 10<sup>5</sup>(額定阻值為將表-2 的基準值乘以右列倍數)

Table 2. (表-2)

	basic value (基準值)											
	E - 96	1.00	1.21	1.47	1.78	2.15	2.61	3.16	3.83	4.64	5.62	6.81
	1.02	1.24	1.50	1.82	2.21	2.67	3.24	3.92	4.75	5.76	6.98	8.45
	1.05	1.27	1.54	1.87	2.26	2.74	3.32	4.02	4.87	5.90	7.15	8.66
	1.07	1.30	1.58	1.91	2.32	2.80	3.40	4.12	4.99	6.04	7.32	8.87
	1.10	1.33	1.62	1.96	2.37	2.87	3.48	4.22	5.11	6.19	7.50	9.09
	1.13	1.37	1.65	2.00	2.43	2.94	3.57	4.32	5.23	6.34	7.68	9.31
	1.15	1.40	1.69	2.05	2.49	3.01	3.65	4.42	5.36	6.49	7.87	9.53
	1.18	1.43	1.74	2.10	2.55	3.09	3.74	4.53	5.49	6.65	8.06	9.76

	basic value(基準值)				
	E - 24	1.0	1.1	1.2	1.3
	1.6	1.8	2.0	2.2	2.4
	2.7	3.0	3.3	3.6	3.9
	4.3	4.7	5.1	5.6	6.2
	6.8	7.5	8.2	9.1	

5.Dimensions and Constructions (尺寸/結構)

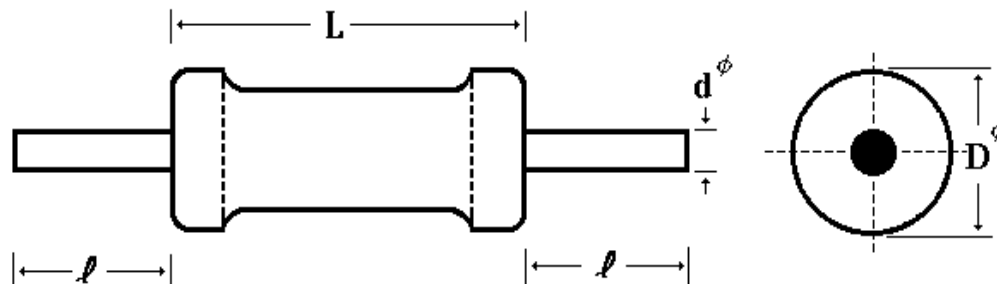


Fig.2. (圖-2)

Product Specification (產品型別) : **RS series****REV****S1-A(V1297)**

Items(項次)

Contents (內容)

1)Dimensions  
(尺寸)

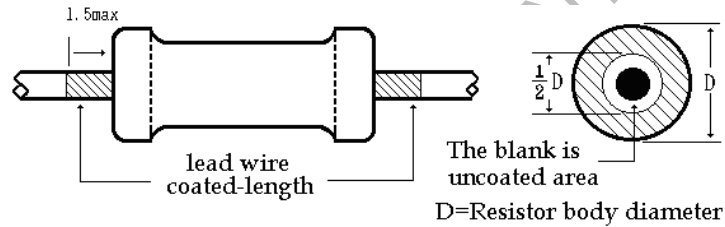
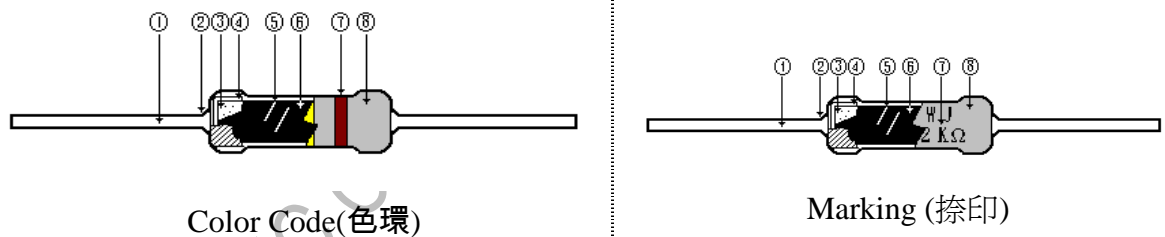
Table 3. (表-3)

mm (公厘)

Rated power (額定功率)	Body length (長度)L	Body dia. (直徑) $D \phi$
S2W	$12^{+1}_{-2}$	$4.0 \pm 0.5$

Painting method (塗裝規範)

Welding point, terminal and lead wire, is permissible to be exposed without the outer coated cover. The extent should be within 1/2 of the arc angle. (塗裝時電阻的焊點, 端面和端子線可允許不被塗料覆蓋(Max1.5mm). 端面部份被塗料覆蓋的限度值為 1/2D)

2)Construction  
(結構圖)

o.	Parts (組成)	Material (材料)
1	lead wire (端子線)	tin plated copper wire (鍍錫銅線)
2	contact of cap and lead wire (鐵帽與端線的連接點)	welding (高壓放電點焊接)
3	ceramic base (陶瓷棒)	alumina ceramic of the kind (氧化鋁)
4	cap (鐵帽)	tin plated iron base (鍍錫鐵片)
	helical cutting groove (螺旋切割線)	-----
6	conductive film (導電皮膜)	metal oxide film (氧化金屬皮膜)
7	marking (捺印)	Color Code(色環)→ 1/4W~ S1/2W 與 “ CL” 結尾料號 UV ink (紫外線油墨)→ 1/2~S5W
8	insulation coat (絕緣塗料)	silicon paint of the kind flame proof ( worth UL94-V0 ) (矽樹脂塗料) (耐燃材質, 符合 UL94-V0)

Product Specification (產品型別品名) : <b>RS series</b>	<b>REV</b>	<b>S1-A(V1297)</b>																																																																																																				
Items(項次)	Contents (內容)																																																																																																					
3). a)Marking (捺印)	<p>Marking on the resistors are based on the following alphanumeric characters (在捺印時使用下列字母組合)</p> <p>2WJ → ( Rated wattage(額定功率), Tolerance(精密度) )</p> <p>560Ω → ( Resistance(阻值) )</p> <p><u>F U 22H</u> → ( Company symbol(商標), Manufacturing date(製造日期) )</p> <p>[ Example ] The date symbol for the resistors made on Feb 14, 2022 例子： 2022 年 2 月 17 日的製造日期代碼為下列說明</p> <div style="text-align: center;"> <p>2 2 H  └──┬──┬──  Year (Last digit of the AD)  Month (<b>February</b>)  Day (<b>17</b>-th day)</p> </div> <p>The symbols representing the manufacturing date(製造日期代碼說明)  Year(年) The last digit of the 4 digits of AD (西元的最後 1 碼)  Month(月) The rules are presented in the following table 4(月份代碼如表-4)  Table 4 (表-4)</p> <table border="1" data-bbox="352 981 1337 1294"> <thead> <tr> <th>Month (月)</th> <th>Symbol(代碼)</th> <th>Month (月)</th> <th>Symbol(代碼)</th> </tr> </thead> <tbody> <tr> <td>January(1 月)</td> <td>1</td> <td>July(7 月)</td> <td>7</td> </tr> <tr> <td>February(2 月)</td> <td>2</td> <td>August(8 月)</td> <td>8</td> </tr> <tr> <td>March(3 月)</td> <td>3</td> <td>September(9 月)</td> <td>9</td> </tr> <tr> <td>April(4 月)</td> <td>4</td> <td>October(10 月)</td> <td>O</td> </tr> <tr> <td>May(5 月)</td> <td>5</td> <td>November(11 月)</td> <td>N</td> </tr> <tr> <td>June(6 月)</td> <td>6</td> <td>December(12 月)</td> <td>D</td> </tr> </tbody> </table> <p>Day(日) The rules are presented in the following table 5(日代碼如表-5)  Table 5 (表-5)</p> <table border="1" data-bbox="352 1442 1337 1809"> <thead> <tr> <th>Day</th> <th>Symbol</th> <th>Day</th> <th>Symbol</th> <th>Day</th> <th>Symbol</th> <th>Day</th> <th>Symbol</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> <td>9</td> <td>9</td> <td>17</td> <td>H</td> <td>25</td> <td>T</td> </tr> <tr> <td>2</td> <td>2</td> <td>10</td> <td>0</td> <td>18</td> <td>J</td> <td>26</td> <td>U</td> </tr> <tr> <td>3</td> <td>3</td> <td>11</td> <td>A</td> <td>19</td> <td>K</td> <td>27</td> <td>V</td> </tr> <tr> <td>4</td> <td>4</td> <td>12</td> <td>B</td> <td>20</td> <td>L</td> <td>28</td> <td>W</td> </tr> <tr> <td>5</td> <td>5</td> <td>13</td> <td>C</td> <td>21</td> <td>M</td> <td>29</td> <td>X</td> </tr> <tr> <td>6</td> <td>6</td> <td>14</td> <td>D</td> <td>22</td> <td>N</td> <td>30</td> <td>Y</td> </tr> <tr> <td>7</td> <td>7</td> <td>15</td> <td>E</td> <td>23</td> <td>P</td> <td>31</td> <td>Z</td> </tr> <tr> <td>8</td> <td>8</td> <td>16</td> <td>F</td> <td>24</td> <td>S</td> <td>-----</td> <td>-----</td> </tr> </tbody> </table>		Month (月)	Symbol(代碼)	Month (月)	Symbol(代碼)	January(1 月)	1	July(7 月)	7	February(2 月)	2	August(8 月)	8	March(3 月)	3	September(9 月)	9	April(4 月)	4	October(10 月)	O	May(5 月)	5	November(11 月)	N	June(6 月)	6	December(12 月)	D	Day	Symbol	Day	Symbol	Day	Symbol	Day	Symbol	1	1	9	9	17	H	25	T	2	2	10	0	18	J	26	U	3	3	11	A	19	K	27	V	4	4	12	B	20	L	28	W	5	5	13	C	21	M	29	X	6	6	14	D	22	N	30	Y	7	7	15	E	23	P	31	Z	8	8	16	F	24	S	-----	-----
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Product Specification (產品型別品名) : RS series

REV

S1-A(V1297)

Items(項次)

Contents (內容)

b)Marking

Color Code(色碼表示)



4TH BAND:TOLERANCE

3RD BAND:MULTIPLE

2ND BAND:2ND SIGNIFICANT FIGURE

1ST BAND:1ST SIGNIFICANT FIGURE

注：色環斷線可允許 $\leq 1/3$ 

BAND COLOR	1ST BAND	2ND BAND	MULTIPLE	TOLERANCE
BLACK	0	0	1	
BROWN	1	1	10	$\pm 1\%$
RED	2	2	100	$\pm 2\%$
ORANGE	3	3	1000	
YELLOW	4	4	10000	
GREEN	5	5	100000	$\pm 0.5\%$
BLUE	6	6	1000000	$\pm 0.25\%$
VIOLET	7	7	10000000	$\pm 0.1\%$
GREY	8	8		$\pm 0.05\%$
WHITE	9	9		
GOLD			0.1	$\pm 5\%$
SILVER			0.01	$\pm 10\%$

4).Outlook  
(外觀)There should be no unusual appearance on the over coat and lead wires.  
(電阻體和端子線外觀無明顯異狀)



Product Specification (產品型別品名) : <b>RS series</b>		<b>REV</b>	<b>S1-A(V1297)</b>	
Items (項次)	Contents (內容)			
6.Characteristics and test methods	Characteristics and test methods are shown in table 6. Characteristics. (電氣特性與對應的測試方法如表-6)			
	Table 6. Characteristics (表-6 電氣特性)			
	No.	Items (項次)	Characteristics (電氣特性)	Test methods (測試方法)
	1	Resistance value (電阻值)	Class: <b>J( ±5 %)</b>	JIS C -5201-1( 4.5 項) classification of applied A
	2	Temperature coefficient of resistance (溫度係數)	$\leq 150K\Omega : \pm 350\text{ppm}/^\circ\text{C}$ $> 150K\Omega \sim \leq 500K\Omega : \pm 800\text{ppm}/^\circ\text{C}$ $> 500K\Omega \sim \leq 1M\Omega : \pm 1500\text{ppm}/^\circ\text{C}$	JIS C -5201-1 measured at room temperature and room temperature+100 °C
	3	Short-time overload (短時間過負荷)	resistance change within $\pm(1 \% + 0.05\Omega)$ (阻值變化範圍)	JIS C -5201-1( 4.13 項) (rated voltage $\times 2.5$ 5 s )
	4	Endurance (under damp and load) (高溫高濕負荷壽命實驗)	resistance change within $\pm(5 \% + 0.1\Omega)$ (阻值變化範圍)	JIS C -5201- 1 (4.24 項) 1)test temperature.40°C $\pm 2^\circ\text{C}$ 2) relative humidity 90 % - 95 % 3) duration 1,000 hours
	5	Endurance ( rated load ) (負荷壽命實驗)	resistance change within $\pm(5 \% + 0.1\Omega)$ (阻值變化範圍)	JIS C- 5201- 1 (4.25.1 項) 1) Rated voltage test temperature70°C $\pm 3^\circ\text{C}$ 2) duration 1,000 hours
	6	Resistance to soldering heat (銲錫耐熱實驗)	resistance change within $J\% : \pm(1 \% + 0.05\Omega)$ (阻值變化範圍)	JIS C -5201-1 (4.18 項) 1)temp. of solder 350°C $\pm 10^\circ\text{C}$ 2)duration of immersion 3.5 s $\pm 0.5$ s
	7	Solder ability (可銲錫性實驗)	95 % (min) coverage (覆蓋率 95%(最少))	JIS C -5201-1 (4.17 項) 1) temp. of solder 245 °C $\pm 5^\circ\text{C}$ 2) duration of immersion 3 s $\pm 0.5$ s 3) preparation not applicable
	8	Temperature cycling (溫度循環實驗)	resistance change within $\pm(1 \% + 0.05\Omega)$ (阻值變化範圍)	JIS C -5201-1(4.19 項) 1) Test temp. -25 °C ~ +85 °C 2) number of 5 cycles
9	Dielectric withstanding voltage (耐電壓實驗)	Flash over, burning, insulation damage should not be observed (不產生火花, 燃燒現象)	JIS C -5201-1 (4.7 項) 1) V-Block 2) test voltage : see table 1 3) duration time 60 s	
10	Resistance to cold (耐寒實驗)	resistance change within $\pm(1 \% + 0.05\Omega)$ (阻值變化範圍)	JIS C -5201-1 (4.23.4 項) 1) test temp. -25°C $\pm 3^\circ\text{C}$ 2) duration 24 hours	

Product Specification (產品型別品名) : RS series		REV	S1-A(V1297)
Items (項次)	Contents (內容)		
Table 6 . Characteristics ( continued ) (表-6 電氣特性 (續))			
No.	Items (項次)	Characteristics (電氣特性)	Test methods (測試方法)
11	Resistance to damp heat (耐高溫高濕)	resistance change within $\pm(1 \% + 0.05 \Omega)$ (阻值變化範圍)	JIS C -5201-1 1) test temp. $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 2) relative humidity 90 % to 95 % 3) duration 240 hours
12	Insulation resistance (絕緣電阻)	more than 1,000M $\Omega$ (超過)	J1 額定電壓超過上 S C 5201-1 (4.6.1 項) 1) test voltage : DC 100V 2) 500V 時，依 500V 施加。
13	Intermittent overload (斷續過負荷)	resistance change within $\pm(5 \% + 0.1 \Omega)$ (阻值變化範圍)	JIS C -5201-1 (4.13 項) 1) applicable more than 100 $\Omega$ 2) Rated voltage $\times 3$ 3) 10,000 cycles
14	Tensile strength (拉力強度)	Neither breakage of the lead wire nor loosening of termination resistance change within $\pm(1 \% + 0.05 \Omega)$ (無端線斷裂或端面鬆脫之現象發生.阻值變化範圍)	JIS C -5201-1(4.16 項) 1) 10N ; 10s $\pm$ 1s (1.02kg)
15	Bending strength (抗折力)	Neither breakage of the lead wire nor loosening of termination resistance change within $\pm(1 \% + 0.05 \Omega)$ (無端線斷裂或端面鬆脫之現象發生.阻值變化範圍)	JIS C -5201-1 (4.16 項) 1) 360 $^{\circ}$ Round-trip ; 5cycle

Items(項次)

Contents (內容)

7. Forming  
7.1 Taping  
(貼帶)

Dimension and form of taping are shown in Fig.3 and table 7  
(貼帶的尺寸和造型分別敘述如：圖-3，表-7.)

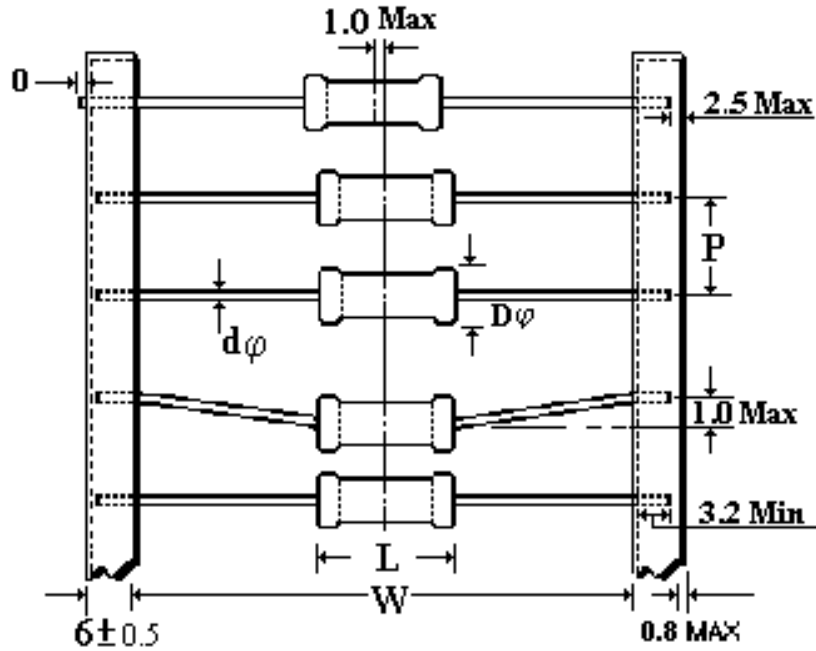


Fig.3 Taping

Table 7.

Unit : mm

Rated Power	W	L	Dφ	P	dφ
S2W	52 ± 1	12 <sup>+1</sup> / <sub>-2</sub>	4.0 ± 0.5	5.0 ± 0.5	0.80 ± 0.1

注：Taping编带为胶带，脱带后引脚会粘胶建议不要脱带加工

Product Specification (產品型別品名) : <b>RS series</b>		<b>REV</b>	<b>S1-A(V1297)</b>	
Items (項次)	Contents (內容)			
8.Packaging quantity (包裝數)	Rated power (額定功率)	Box (pcs) (盒裝(支))	Inner box (內盒)	Exterior Box (外箱)
	S2W	1000	255×80×90(mm)	435 ×280 ×280(mm)
9.The others (其它)	This specification can be revised by the agreement between the customer and the manufacture, in case of necessity to revise the standard of this specification. (在經過客戶與雙羽協商同意下, 本承認書的標準可予以變更)			
10.Doubt (疑問)	If any doubt about this specification occurred, it will be clarified by the discussion between the customer and the manufacture. (對本承認書之任何疑問可經由客戶與雙羽之討論解決之)			
11.Revision (修訂)	This specification will be revised by the discussion and consent between the customer and the manufacture. (本承認書可經由客戶與雙羽之討論後予以修訂)			
12.Notes (備註)	1)Storage condition (儲存條件) It is desirable that the resistors are stored in the ambient temperature from 0 °C to 30 °C and relative humidity under 65 %. High humidity, dust, harmful gas, for example hydrogen chloride and sulfuric gas should be avoided. Please do not store the resistors for a long time, use the resistors within a year after the deliiver. (電阻體的恰當儲存條件為 0 °C 至 30 °C 同時相對溼度低於 65 %。高濕,灰塵和有害氣體, 好比 鹽酸氣, 硫酸氣 都需避免接觸電阻體。電阻請勿儲存過久,建議在收料 1 年內使用)			
	2)Power derating (功率遞減) For the long term stability of the application, power should be derated obdiently according to the power derating curve. (為了維持電阻體在使用中的長期穩定性,使用功率遞減方式需確實遵守功率遞減曲線)			
	3)Resistor positioning (電阻體的位置) When the resistors are placed around other electric parts, the minimum space should be kept above 5 mm. (電阻體與其它電子元件最好距離 0.5 公分)			

Product Specification (產品型別品名) : <b>RS series</b>	<b>REV</b>	<b>S1-A(V1297)</b>
Items (項次)	Contents (內容)	
	<p>4)Soldering (銲錫)            During the process of soldering, the effect of heat caused by the soldering should be kept as little as possible. The suggested condition is under 260 °C and within 7 s.            (在銲錫過程中, 爲了避免高溫影響電阻體, 所以受熱時間最好越短越好. 建議條件爲 260 °C , 7 秒鐘)</p> <p>5)Shock to the resistors (對電阻體進行衝撞)            When the resistors are subject to mechanical shock, the resistors might be broken. This is quite likely in the automatic insertion machine. Please adjust the machine accordingly.(當電阻體受到衝撞時, 電阻體可能會斷裂. 這在自動插件時可能發生. 如有類似情形發生,請調整自動插件機的力量)            Also do not drop the resistors from a high ground. (請勿將電阻體從高處墜落)</p> <p>6)Forming (造型)            During the forming process, the resistor body and the welding point should not be subjected to too much stress.            (在造型時,電阻體和焊點必須避免過大的受力)</p> <p>7) <b>2003-01-01 guide Lead-Free products</b>  <b>(2003-01-01 導入無鉛產品)</b></p> <p>8) <b>2008-08-01 Guide Halogen-Free products.</b>  <b>(2008-08-01 導入無鹵產品)</b></p> <p>9)耐焊錫曲線圖</p> <p>10) 产品保质期期限 3 年。</p> <p style="text-align: center;"><b>台灣雙羽電機股份有限公司</b>  <b>耐焊錫溫度曲線圖 (Lead-Free)</b></p> <p>1. 沾錫性測試: 245 +5°C / 3.5 sec. 95%            2. 耐焊錫溫度: 260°C / 5 sec</p> 