Approval Sheet

承認書

for

Over Temperature Protector

Resistors

過溫保護電阻器

OTP series

±5%

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1. PRODUCT 產品描述:

The Over Temperature Protector Resistors (OTP) is a unique designed for high reliability applications requirement, it is a new type of power resistors, with functions of over temperature and over current protection, where the fusing protector is placed inside the resistor.
(過溫保護電阻器是針對高信賴性電路的應用需求設計，這是新型的功率電阻器，具有過溫或過流時對電路進行保護的作用，保險絲包含在電阻內部)

2. PART NUMBER DEFINITION 料號定義:

Part number of the cement Over Temperature Protector Resistors is identified by the name, power, tolerance, packing, fusing characteristcis, special type and resistance value and wire-wound suffix. (此料號定義包括類別、功率、精度、包裝方式、熔斷特性、特殊型別、阻值以及特殊規格後綴碼)

Example：

OTP	1WS	J	B	A	52-	10R	CM
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Series Name	Power Rating	Resistance Tolerance	Packing Style	Fusing Characteristics	Special Type	Resistance Value	Suffix for Alloy wire

(1) Style (類別)： OTP Series

(2) Power Rating (功率)： 1WS=1W, 2WS=2W

(3) Tolerance (精度)： J = ±5%

(4) Packaging Type (包裝)： B = Bulk Packing
T = Tape on Box Packing

(5) Fusing Characteristics(熔斷特性)： Represents the specification of fusing characteristics, See table II

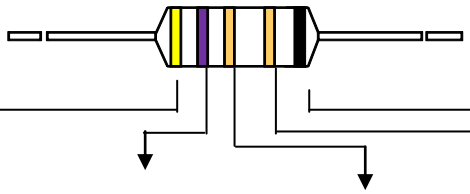
(6) Special Type（特殊型別）： 52- = 52.4mm type packing

(7) Resistance Value (阻值)：E24 Series,
Example： 1R=1 ohm 10R=10 ohm …

(8) Suffix for resistance wire : Optional code. Represents specific specification, required only when wirewound resistor is with special specification.

Example : CM, CN, FB, FE, FF, FD And etc.

3. BAND-CODE 色環標識:



COLOR	1st BAND	2nd BAND	MULTIPLIER	TOL.	Fusing Characteristic
BLACK	0	0	1Ω		Code A
BROWN	1	1	10Ω		Code B
RED	2	2	100Ω		Code C
ORANGE	3	3	1KΩ		Code D
YELLOW	4	4			
GREEN	5	5			
BLUE	6	6			
VIOLET	7	7			
GREY	8	8			
WHITE	9	9			
GOLD			0.1Ω	± 5 % (J)	
SILVER			0.01Ω		

4. ELECTRICAL CHARACTERISTICS 電器特性：

TABLE I

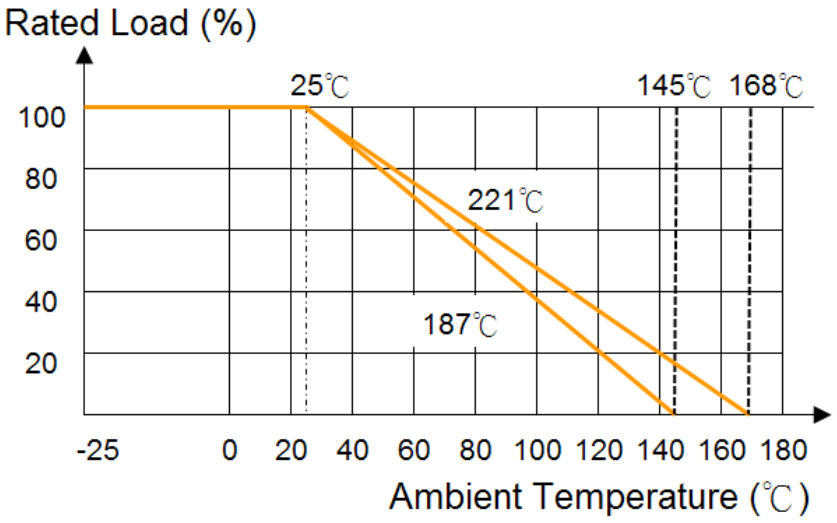
STYLE	OTP1WS	OTP2WS
Power Rating at 25 ℃(功率)	1W	2W
Maximum Working Voltage (最大工作電壓)	$=\sqrt{\text{Power Rating} \times \text{Resistance Value}}$	
Voltage Proof on Insulation (絕緣耐電壓)	500V	
Resistance Range (阻值範圍)	1Ω~100Ω	1Ω~200Ω
Function Temperature (動作溫度)	187℃- 221℃	
Temperature Coefficient (溫度係數)	±5000 ppm /℃	

＊ Below or over this resistance on request.

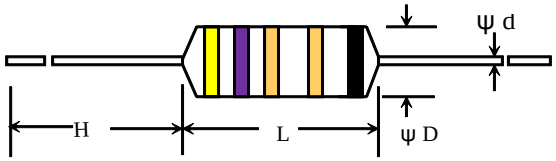
TABLE II Fusing Characteristics 熔斷特性

Code	Standard Current(A)	Fusing Temperature(℃)
A	3A	221^{+5}_{-10}
B	2A	221^{+5}_{-10}
C		187^{+5}_{-10}
D	3A	187^{+5}_{-10}
Short-circuit test Voltage (短路測試電壓)		250V

5. DERATING CURVE 功率降額曲線



6. DIMENSIONS 尺寸



STYLE	DIMENSIONS			(unit: mm)
Miniature	L	ψ D	H	ψ d
OTP1WS	11±0.5	4.0±0.2	26±2.0	0.55±0.05
OTP2WS	12±0.5	4.8±0.2	26±2.0	0.55±0.05

7. ENVIRONMENTAL CHARACTERISTICS 環境特性：

(1) Functioning Temperature(動作溫度 Tf)

Over temperature protector resistor shall be exposed in the test oven or oil bath, to Tf -20℃ for devices rated less than 250℃ until temperature has stabilized. The temperature shall then be increased steadily with a rate of rise between 0.5℃/min to 1℃/min until all specimens have functioned.
The individual functioning temperature shall be recorded and they shall be not less than Tf -20℃ and not greater than Tf for devices rated
溫度保險絲電阻放入油浴中, 溫度穩定後, 從 Tf -20℃開始升溫, 升溫速度平穩的保持 0.5~1 ℃/min,直到測試樣品 Function. 實際的 Function 溫度必須在低於 Tf 溫度 20 ℃到 Tf 溫度範圍內;

(2) Terminal Strength(引出端強度)

To fix the resistor body vertically, a static load of 10 N is to be gradually applied on the lead terminal for 60 seconds , without any mechanical damage.
溫度保險型电阻保持引脚垂直，在引脚末端加上 10 N 的砝码，保持 60 s，无机械损伤。

(3) Resistance to Soldering Heat 耐焊接熱

The terminal lead shall be dipped into the solder pot at 255 ± 2 °C for 2 ± 0.5 seconds up to 2.5 ~ 3.5mm. The change of the resistance value shall be within ± 1.0 % + 0.05 Ω
溫度保險型電阻浸入 255 ± 2 °C 的錫爐中 2 ± 0.5 秒, 測試前後的阻值變化在± 1.0 % + 0.05 Ω 範圍內

(4) Short Time Over Load Test 短時間過負載測試

At 2 times of the rated voltage applied for 5 seconds, the resistor should be free from defects after the resistor is released from load for about 30 minutes
施加 2 倍額定電壓持續 5 秒，自然冷卻 30 分鐘后測量電阻值。

Short Time Overload Voltage = $\sqrt{5 * \text{Power Rating} \times \text{Resistance Value}}$

短時間過負載電壓= $\sqrt{5 \times \text{額定功率} \times \text{電阻值}}$

The change of the resistance value should be within ± 2%R
電阻值變化率須在± 2%R 以內

(5) Insulation Voltage 絕緣耐電壓

The resistor shall be clamped in the metal Block. Apply the insulation voltage specified in the “Table I “ between the terminals connected together with the block for about 60 seconds, the maximum testing leadage current is AC 1.5mA. The resistor shall be able to withstand without breakdown or flashover.
將電阻夾于金屬夾具內，按“表格 I”中絕緣耐電壓值施加在導線端和金屬夾具之間持續 60 秒，測試漏電流最大值 AC: 1.5mA，電阻不能出現擊穿或電弧現象。

(6) Temperature Coefficient Test 溫度係數測試

Test of resistors above room temperature 100°C ± 2°C (Testing Temperature 115°C to 130°C) at the constant temperature silicon plate for over 5 minutes. Then measure the resistance value.
The Temperature Coefficient is calculated by the following equation and its value should be within the range of requested.
先在室溫(to)下測試電阻阻值，記錄爲 R0；然後在高於室溫 100°C ± 2°C (t,在 115°C to 130°C 之間)矽油中放置 5 分鐘，然後測量電阻值，記錄爲 R。
溫度係數用以下公式計算，實際值須在要求範圍內。

$$\text{ResistorTemperatureCoefficient 電阻溫度係數} = \frac{R - R_0}{R_0} \times \frac{1}{t - t_0} \times 10^6$$

R = Resistance value under the testing temperature 測試溫度下的電阻值
R0 = Resistance value at the room temperature 室溫下的電阻值
t =The testing temperature 測試溫度
t_o = Room temperature 室溫

(7) Insulation Resistance 絕緣阻抗

Apply "measuring voltage" between protective coating and termination for 1 min.,then measure. The measuring voltage shall be either 100V±15V d.c. for resistors with an insulation voltage lower than 500V or 500V±50V d.c. for resistors with an insulatin voltage equal to or greater than 500V.
The test resistance should be ≧100M ohm.
在電阻保護殼表面和導線端施加測試電壓 1 分鐘，然後測量阻抗值。當絕緣耐電壓值小於 500V 時測量電壓爲 100V±15V d.c；當絕緣耐電壓值大於或等於 500V 時測量電壓爲 500V±50V d.c。
測試絕緣阻抗值須≧100M ohm.

（8）Surge Voltage Withstanding 雷擊浪涌測試

The resistors are designed to withstand 1.2/50 μs pulse voltage according to IEC61000-4-5, test for a total of 20 pulses, 60 seconds between each pulse.
The designed standard withstanding pulse voltage is 1KV, special voltage is on request.
The resistance value change rate between pre-and –post test shall be within ±5%.
The customized designing withstanding pulse voltage as below:
按照 IEC60115-4-5 的標準，將此電阻安裝在模擬電源電路中施加 1.2/50μs 雷擊電壓，測試共 20 次，每次間隔 60 秒。
設計的標準測試電壓是 1KV, 可按客戶要求設計不同的抗浪涌電壓
測試前後電阻值變化率須在 ±5.0 % + 0.05 Ω 內

8. Plant Address 工廠地址：

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单击下面可查看定价，库存，交付和生命周期等信息

>>Yageo(国巨)