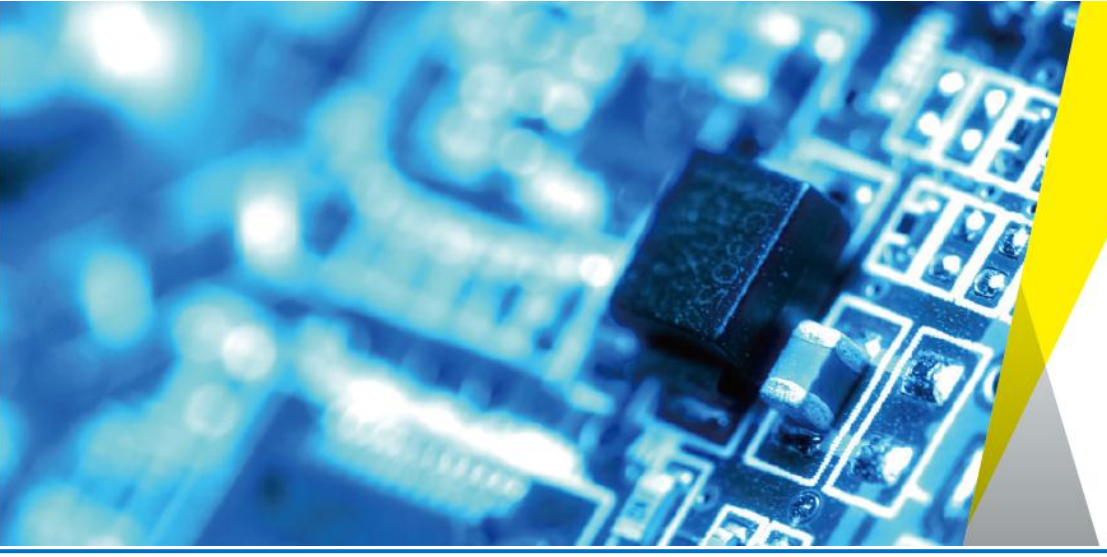

DATA SHEET

Product Name	**High Power Wire-wound Iron-Case Resistors**
Part Name	**HAWF Series**
File No.	**DIP-SP-059**

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	Royal Electronic Factory (Thailand) Co., Ltd.
	Royal Technology (Thailand) Co., Ltd.

1. Scope

1.1 This datasheet is the characteristics of High Power Wire-wound Iron-Case Resistors manufactured by UNI-ROYAL.

1.2 High Power Wire-wound Flat Aluminum Shell Fixed Resistors

1.3 Easy to assembled on PCB

1.4 Application：Power supply of frequency converter

2. Part No. System

The standard Part No. includes 14 digits with the following explanation:

2.1 High Power Wire-wound Iron-Case Resistors the 1st to 4rd digits are to indicate the product type.

Example: HAWF= High Power Wire-wound Iron-Case Resistors

2.2 5th~6th digits:

2.2.1 This is to indicate the wattage or power rating. To dieting the size and the numbers,

The following codes are used; and please refer to the following chart for detail:

W=Normal Size; S=Small Size; U=Extra Small Size; "1"~"G"to denotes"1"~"16"as Hexadecimal:

1/16W~1/2W (＜1W)

Wattage	1/2	1/3	1/4	1/5	1/6	1/8	1/10	1/16
Normal Size	W2	W3	W4	W5	W6	W8	WA	WG
Small Size	S2	S3	S4	S5	S6	S8	SA	SG

1W~16W (≧1W)

Wattage	1	2	3	5	7	8	9	10	15
Normal Size	1W	2W	3W	5W	7W	8W	9W	AW	FW
Small Size	1S	2S	3S	5S	7S	8S	9S	AS	FS

2.3 The 7th digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance.

J=±5%　　K= ±10%

2.4 The 8th to 11th digits is to denote the Resistance Value.

2.4.1 For the standard resistance values of E-24 series, the 8th digit is "0" ,the 9th & 10th digits are to denote the significant figures of the resistance and the 11th digit is the zeros following;

For the standard resistance values of E-96 series, the 8th digit to the 10th digits is to denote the significant figures of the resistance and the 11th digit is the zeros following.

2.4.2 The following number s and the letter codes are to be used to indicate the number of zeros in the 11th digit:

$0=10^0$　$1=10^1$　$2=10^2$　$3=10^3$　$4=10^4$　$5=10^5$　$6=10^6$　$J=10^{-1}$　$K=10^{-2}$　$L=10^{-3}$　$M=10^{-4}$　$N=10^{-5}$　$P=10^{-6}$

2.4.3 The 12th, 13th & 14th digits.

The 12th digit is to denote the Packaging Type with the following codes:

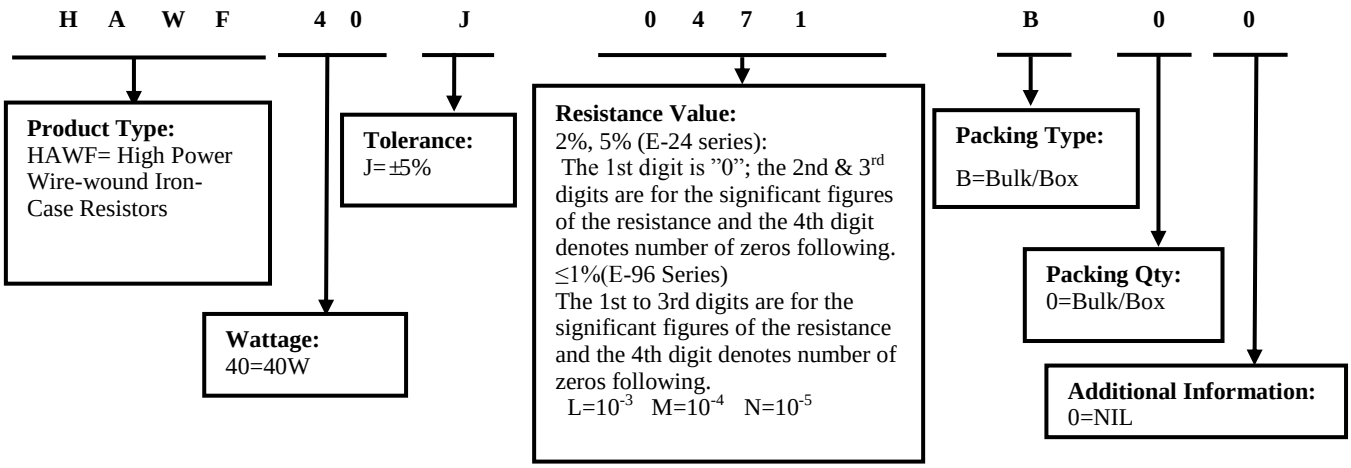
B=Bulk /Box

2.4.4 Current Sense Resistors, The 13th digit should be filled with "0"

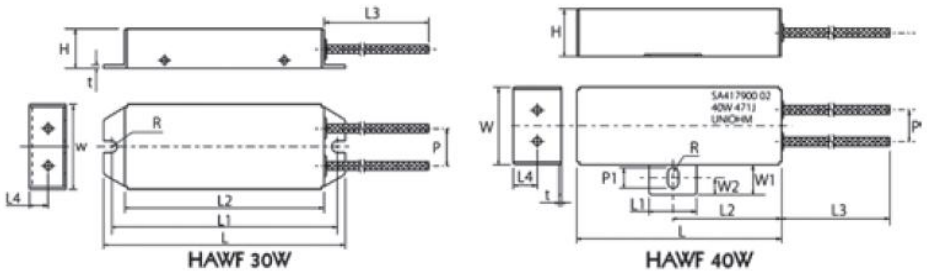
2.4.5 Current Sense Resistors, The 14th digit should be filled with "0"

3. Ordering Procedure

(Example: HAWF 40W ±5% 470Ω B/B)



4. Dimension



Unit:mm

Type	L±1	W±1	H±1	L1±1
HAWF 30W	97	32	15	90.5
HAWF 40W	85	32	20	20

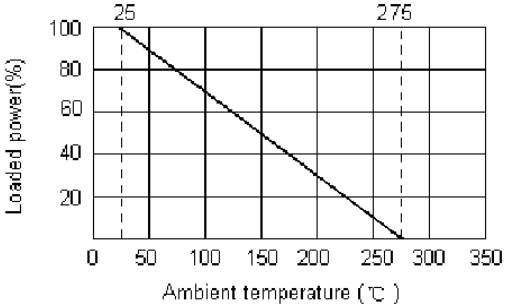
***Remark: For further information, please contact our sales team.**

5. Resistor marked

1 —— SA417900 02
2 —— 40W 471J
3 —— UNIOHM

Code description and regulation:
1. Part No. of Customer ： SA417900 02
2.Type: Power rating： 40W, Resistance: 470Ω, Tolerance: ±5%
3. Mark： UNIOHM

6. Derating Curve



6.1Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

$$RCWV = \sqrt{P \times R}$$

Where: RCWV = rated dc or RMS ac continuous working voltage at commercial-line frequency and waveform (VOLT.)

P = power rating (WATT.)

R= nominal resistance (OHM)

7. Performance Specification

Characteristic	Limits	Test method (GB/T 5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	±260PPM/℃ Max	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (PPM/℃) R_1: Resistance Value at room temperature （t_1）; R_2: Resistance at test temperature (Upper limit temperature or Lower limit temperature) t_1: +25 ℃ or specified room temperature t_2: Upper limit temperature or Lower limit temperature test temperature
Short-time overload	Resistance change rate is: ±(2%+0.05Ω)Max. With no evidence of mechanical damage.	4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds.
Surface temperature	Temperature：≦315℃ Resistance change rate is: ±(1%+0.05Ω)Max	Rate voltage for 30 minutes
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down. Resistance change rate is: ±(1%+0.05Ω)Max	4.7In resistors between the shell and alloy applied voltage AC2500V (5mA) for 60 seconds
Insulation Resistance	Insulation Resistance ＞100MΩ	4.6 The measuring voltage shall be at 500V DC.
Strength of resistor	With no evidence of mechanical damage	49N for 10±1 seconds
Vibration	With no evidence of mechanical damage Resistance change rate is: ±(1%+0.05Ω)Max	Frequency varied 10Hz→55Hz→10Hz in 1 min, the amplitude is 1.5mm, 3 directions (X/Y/Z) for every 2h
High Temperature Exposure	The mark have no evidence of damage	315±5℃ for 2h and then place 1~2h
Thermal Shock	With no evidence of mechanical damage Resistance change rate is: ±(2%+0.05Ω)Max	Load rated voltage , -30℃, 30 minutes
Humidity (Steady State)	The mark have no evidence of damage Resistance change rate is: ±(2%+0.05Ω)Max Insulation Resistance ≧2.5MΩ(DC500V)	Resistance change after 500 hours in a humidity test chamber controlled at 40℃ ±2℃ and 90 to 95% relative humidity and apply DC100V between lead and shell
Load life in humidity	The mark have no evidence of damage Resistance change rate is: ±(3%+0.05Ω)Max	500h at DC 0.1 times rated power, 40℃ and 90~95% relative humidity.
Load life	The mark have no evidence of damage Resistance change rate is: ±(5%+0.05Ω)Max	4.25.1 permanent resistance change after 500 hours operating at RCWV with duty cycle of 1.5 hours “ON”, 0.5 hour “OFF” at 25℃ ±5℃ ambient.
Flame retardant	No burning	1~6 times rated voltage for 2h

8. Note

8.1. UNI-ROYAL recommend products store in warehouse with temperature between 15 to 35℃ under humidity between 25 to 75%RH.

Even under storage conditions recommended above, solder ability of products will be degraded stored over 1 year old.

8.2. Cartons must be placed in correct direction which indicated on carton, otherwise the reel or wire will be deformed.

8.3. Storage conditions as below are inappropriate:

a. Stored in high electrostatic environment

b. Stored in direct sunshine, rain, snow or condensation.

c. Exposed to sea wind or corrosive gases, such as Cl_2, H_2S, NH_3, SO_2, NO_2, etc.

9. Record

Version	Description	Page	Date	Amended by	Checked by
1	First version	1~5	Apr.16, 2019	Haiyan Chen	Yuhua Xu