昆 山 厚 聲 電 子 工 業 有 限 公 司
Uniroyal Electronics Industry Company Limited

Specification for Approval

Customer : **DACHS ELECTRONICA S.A.**

Product Name: **CURRENT SENSING CHIP RESISTORS**

Part Name : **CS SERIES ±1%、±5%**

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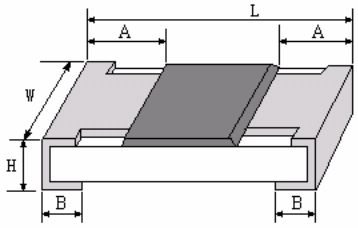
Contents

File Name: CS SERIES ±1%、±5%		Date	2009.11.23	Edition No.	1
Amendment Record				Signature	
Edition	Prescription of amendment	Amend Page	Amend Date	Amended by	Checked by

1.0 Scope:

This sheet is the statement of the Current Sensing Chip Resistor specification that ROYAL PARTS'S productions can meet.

2.0 Ratings & Dimension:

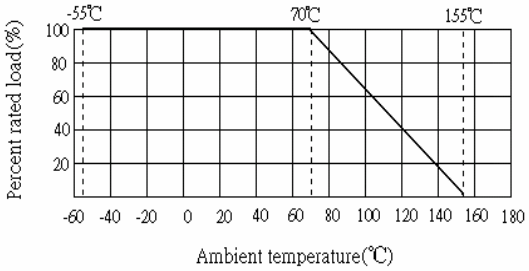


Dimension (mm)

Type		CS03	CS05	CS06	CS07	CS10	CS12
Power Rating at 70℃		1/10W (1/5WS)	1/8W (1/4WS)	1/4W (1/3WS)	1/3W (1/2WS)	1/2W (3/4WS)	1W
Dimension(mm)	L	1.60±0.10	2.0±0.15	3.10±0.15	3.10±0.10	5.00±0.10	6.35±0.10
	W	0.80 +0.15 -0.10	1.25 +0.15 -0.10	1.55 +0.15 -0.10	2.60 +0.15 -0.10	2.50 +0.15 -0.10	3.20 +0.15 -0.10
	H	0.45±0.10	0.55±0.10	0.55±0.10	0.55±0.10	0.55±0.10	0.55±0.10
	A	0.30±0.20	0.40±0.20	0.45±0.20	0.60±0.25	0.60±0.25	0.60±0.25
	B	0.30±0.20	0.40±0.20	0.45±0.20	0.50±0.20	0.50±0.20	0.80±0.30
Resistance range	±1%	33mΩ~1Ω	25mΩ~1Ω	20mΩ~1Ω	20mΩ~1Ω	20mΩ~1Ω	20mΩ~1Ω
	±5%	33mΩ~1Ω	25mΩ~1Ω	20mΩ~1Ω	20mΩ~1Ω	20mΩ~1Ω	20mΩ~1Ω
Dielectric Withstanding Voltage		300V	500V	500V	500V	500V	500V
Operating Temperature		-55 ~ +155℃					

3.0、Power Rating:

Resistors shall have a power rating based on continuous full load operation at an ambient temperature of 70℃, for temperature in excess of 70℃,the load shall be derated as shown in the figure 1.



3.1、Voltage rating:

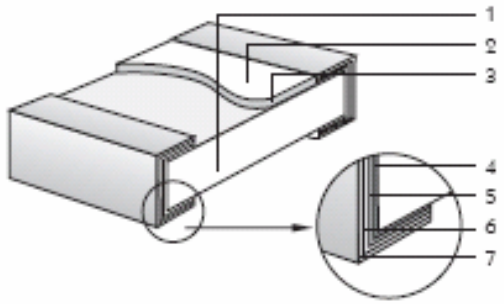
Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

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

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)

In no case shall the rated dc or RMS ac continuous working voltage be greater than the applicable maximum value. The overload voltage is 2.5 times RCWV.

4.0 Structure:

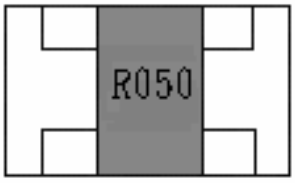


1. High purity alumina substrate
2. Protective covering
3. Resistive covering
4. Termination (inner) Ni/Cr
5. Termination (between) Cu
6. Termination (between) Ni
7. Termination (outer) Sn

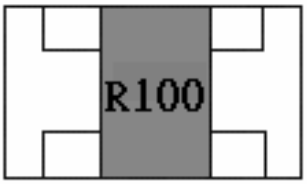
5.0 Marking:

(1) For CS03 size .due to very small size of the resistors body, there is no marking on the body.

(2) ±1%,±5%Tolerance: product below 1Ω show as following, the first digit is "R", which as decimal point.

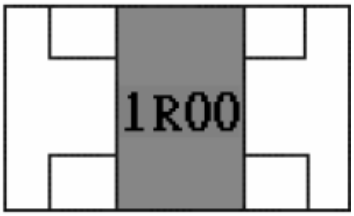


R050→50mΩ



R100→ 100mΩ

(3) ±1%,±5%Tolerance: product of 1Ω show as following, the first digit is "1", read alphabet "R" as decimal point.



1R00→ 1Ω

6.0 Performance Specification:

Characteristic	Limits		Test Method (JIS-C-5201 & JIS-C-5202)
Temperature Coefficient	CS03	33mΩ≦R≦50mΩ : ±500PPM/℃ 50mΩ<R≦100mΩ: ±400PPM/℃ 0.1Ω<R≦0.5Ω : ±300 PPM/℃ 0.5Ω<R≦1Ω : ±200PPM/℃	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 temp. (T_1) R_2: resistance value at room temp. +100℃ (Tt_2) Test pattern: room temp. (T_1), room temp. +100℃ (T_2)
	CS05	25mΩ≦R≦100mΩ: ±400PPM/℃ 0.1Ω<R≦0.5Ω : ±300 PPM/℃ 0.5Ω<R≦1Ω : ±200PPM/℃	
	CS06	20mΩ≦R≦100mΩ: ±400PPM/℃ 0.1Ω<R≦0.5Ω : ±300 PPM/℃ 0.5Ω<R≦1Ω : ±200PPM/℃	
	CS07 CS10 CS12	20mΩ≦R<50mΩ : ±400PPM/℃ 0.5Ω≦R≦1Ω : ±200PPM/℃	
Short-time overload	±1%	±(1%+0.005Ω) Max.	4.13 Permanent resistance change after the application of 2.5 times RCWV for 5 seconds.
	±5%	±(2%+0.005Ω) Max	
Terminal bending	±(1%+0.005Ω) Max		4.33 Twist of test board: Y/x = 3/90 mm for 60Seconds
Solderability	95% coverage Min.		Wave solder: Test temperature of solder: 245℃±3℃ dipping time in solder: 2-3 seconds.
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation breaks down.		4.7 Resistors shall be clamped in the trough of a 90℃metallic v-block and shall be tested at ac potential respectively specified in the given list of each product type for 60-70 seconds.
Temperature cycling	±(1.0%+0.005 Ω)Max		4.19Resistance change after continuous five cycles for duty cycle specified below:

STEP	TEMPERATURE	TIME
1	-55℃±3℃	30 MINS
2	ROOM TEMP.	10 --- 15 MINS
3	+155℃±2℃	30 MINS
4	ROOM TEMP.	10 --- 15 MINS

Soldering heat	Resistance change rate is: ±(1%+0.005Ω) Max		4.18 Dip the resistor into a solder bath having a temperature of 260℃±5℃ and hold it for 10±1 seconds.
Load life in humidity	±1%	±(1.0%+0.005Ω) Max.	7.9 Resistance change after 1,000 hours (1.5 hours "ON",0.5 hour "OFF") at RCWV in a humidity chamber controlled at 40℃±2℃ and 90 to 95% relative humidity.
	±5%	±(3.0%+0.005Ω) Max.	
Load life	±1%	±(1.0%+0.005Ω) Max.	4.25.1 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle 1.5 hours "ON", 0.5 hour "OFF" at 70℃±2℃ ambient.
	±5%	±(3.0%+0.005Ω) Max.	

7.0 Explanation of Part No. System:

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

7.1 This is to indicate the Current Censing Chip Resistor size.

Example: CS03 、CS05、CS06、CS07、CS10、CS12

7.2 5th~6th digits:

7.2.1 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~ 1W:

Wattage	1/2	1/3	1/4	1/5	1/6	3/4	1/8	1/10	1/16	1
Normal Size	W2	W3	W4	W5	W6	/	W8	WA	WG	1W
Small Size	S2	S3	S4	S5	S6	07	S8	SA	SG	1S

7.2.2 For power rating less than 1 watt, the 5th digit will be the letters "W" or "S" to represent the size required & the 6th digit will be a number or a letter code.

Example: WA=1/10W; S4=1/4W-S

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

F=±1% G=±2% J=±5% K= ±10%

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

7.4.1 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 number; 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.

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

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

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

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

C=Bulk in (Chip Product) T=Tape/Reel

7.4.4 The 13th digit is normally to indicate the Packing Quantity of Tape/Box & Tape/Reel packaging types. The following letter code is to be used for some packing quantities:

1=1000pcs 2=2000pcs 3=3000pcs 4=4000pcs5=5000pcs C=10000pcs D=20000pcs

Chip Product: BD=B/B-20000pcs TC=T/R-10000pcs

7.4.6 For some items, the 14th digit alone can use to denote special features of additional information with the following codes:

E=For "Environmental Protection"

8.0 Ordering Procedure: (Example: CS05 1/8W ±1% 100mΩ T/R-5000)

C S 0 5 W 8 F 1 0 0 L T 5 E

Product Type:
Fill-in these 4 Digits with current sensing chip resistor types as follows:

CS03
CS05
CS06
CS07
CS10
CS12

Wattage:
W8=1/8W
WA=1/10W
S5=1/5WS
S8=1/8WS
W4=1/4W
S4=1/4WS
S3=1/3WS
W2=1/2W
07=3/4WS
1W=1W

Tolerance:
F=±1%
J=±5%

Resistance Value:
E-24 series:
The 1st digit will be "0" ;the2nd & 3rd digits are for the significant figures of the resistance and the 4th digit indicate the numbers of zeros following.
E-96 series value (1%):
The 1st to 3rd digits are for the significant figures OF the resistance and 4th digit denotes number of zeros following.
$K=10^{-2}$; $L=10^{-3}$; $M=10^{-4}$

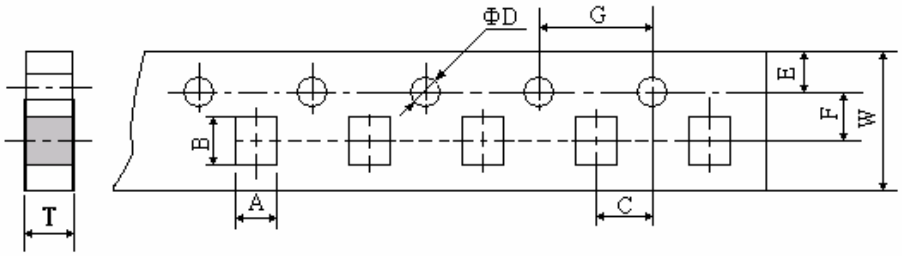
Packing Type:
T=Tape/Reel

Packing quantity:
1=1000PCS
2=2000PCS
3=3000PCS
4=4000PCS
5=5000PCS
C=10000PCS
D=20000PCS

Special Feature
E= Lead-Free

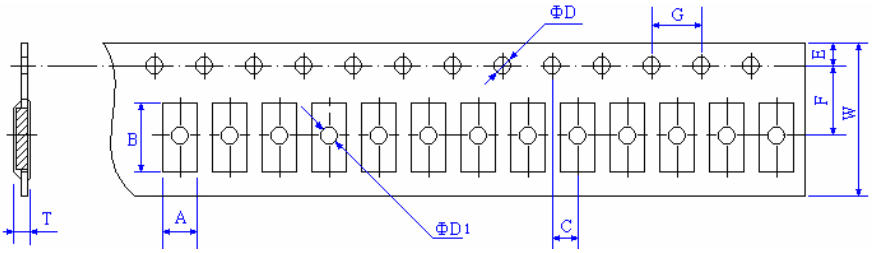
9.0 Packaging:

9.1 Tapping Dimension:



UNIT: mm

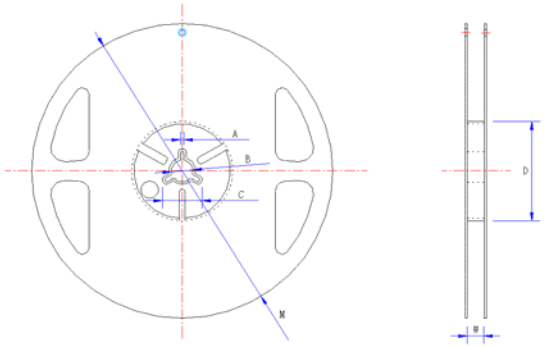
TYPE	A ± 0.2	B ± 0.2	C ± 0.05	ϕD +0.1 -0	E ± 0.1	F ± 0.05	G ± 0.1	W ± 0.2	T±0.10
CS03	1.10	1.90	2.00	1.50	1.75	3.5	4.00	8.0	0.67
CS05	1.65	2.40	2.00	1.50	1.75	3.5	4.00	8.0	0.81
CS06	2.00	3.60	2.00	1.50	1.75	3.5	4.00	8.0	0.81
CS07	2.80	3.50	2.00	1.50	1.75	3.5	4.00	8.0	0.75
CS10	2.80	5.40	2.00	1.50	1.75	5.5	4.00	12.0	0.75



UNIT: mm

TYPE	A±0.2	B±0.2	C±0.05	+ 0.1 ϕD - 0	+0.25 ϕD1 -0	E±0.1	F±0.05	G±0.1	W±0.2	T±0.10
CS12	3.5	6.7	2.0	1.5	1.5	1.75	5.5	4.0	12.00	1.0

9.2 Dimension:



Unit: mm

TYPE	TAPING	SIZE	A±0.5	B±0.5	C±0.5	D±1	M±2	W±1
CS03	Paper	5000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
CS05	Paper	5000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
CS06	Paper	5000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
CS07	Paper	5000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
CS10	Paper	4,000 PCS REEL	2.0	13.0	21.0	60.0	178	13.8
CS12	Embossed	4,000 PCS REEL	2.0	13.0	21.0	60.0	178	13.8

10.0 Storage:

The products should be placed in the dry and ventilation with 15~35℃ and lower than 25~75%RH,and prevent it from pressing and humidity. The guaranteed period of product performance is within one year from shipment by the company, provided that the above-mentioned storage conditions have been satisfied.