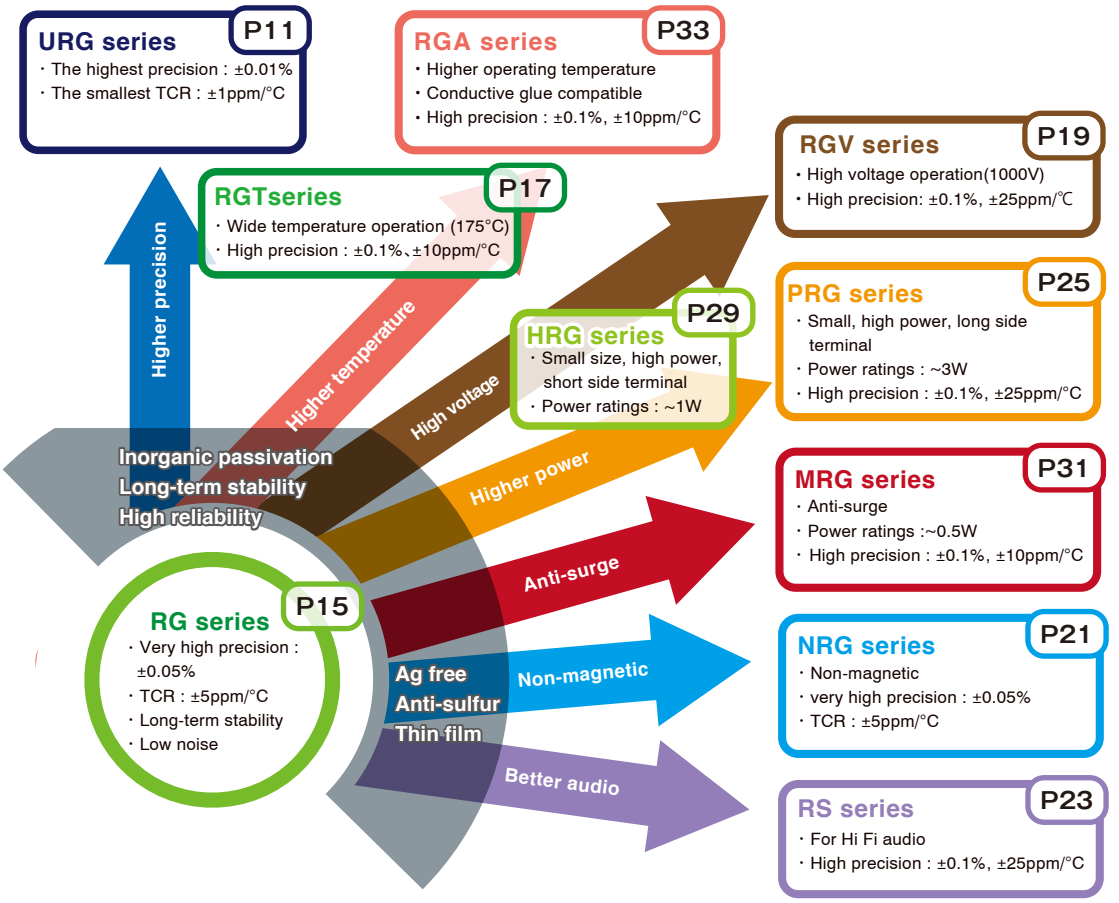
Selection Guide

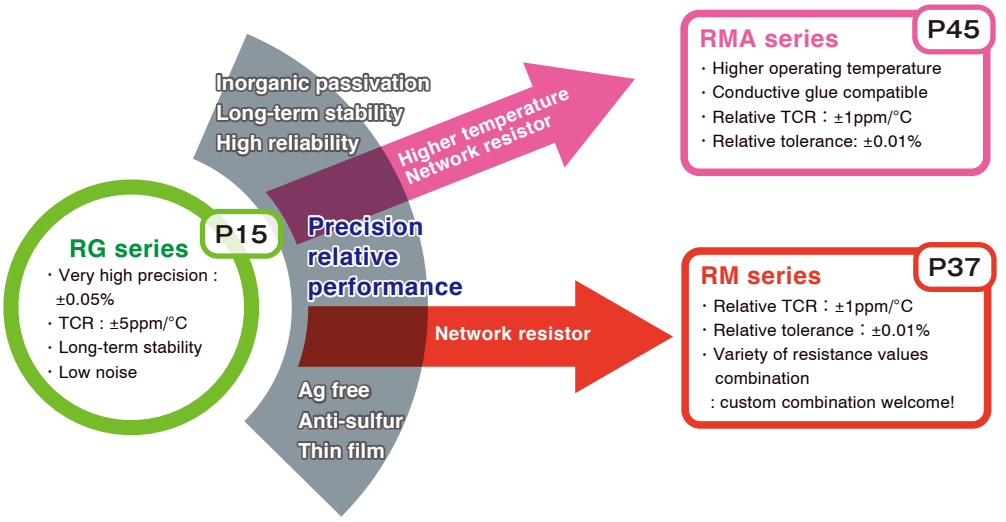
The RG series, the most popular metal thin film chip resistors because of their high precision, high reliability and long-term stability, is the base of our line-up of new innovative products: a higher precision, higher operating temperature, higher power handling capability, higher anti-surge capability version of the RG series and so on.
All of these products employ the inorganic passivation technology that enables high precision and high reliability.
In addition, our thin film based terminal technology does not involve any Ag (silver) and they are sulfur impervious.
The following diagram shows distinctive characteristics of these products and their relationships.

Higher precision : URG series
Higher operating temperature : RGT series, RGA series, RMA series (resistive networks)
High voltage: RGV series
High power : PRG series (long side terminal), HRG series (short side terminal)
Anti-surge : MRG series
Non-magnetic : NRG series
Audio grade : RS series

Relation map of thin film chip resistors

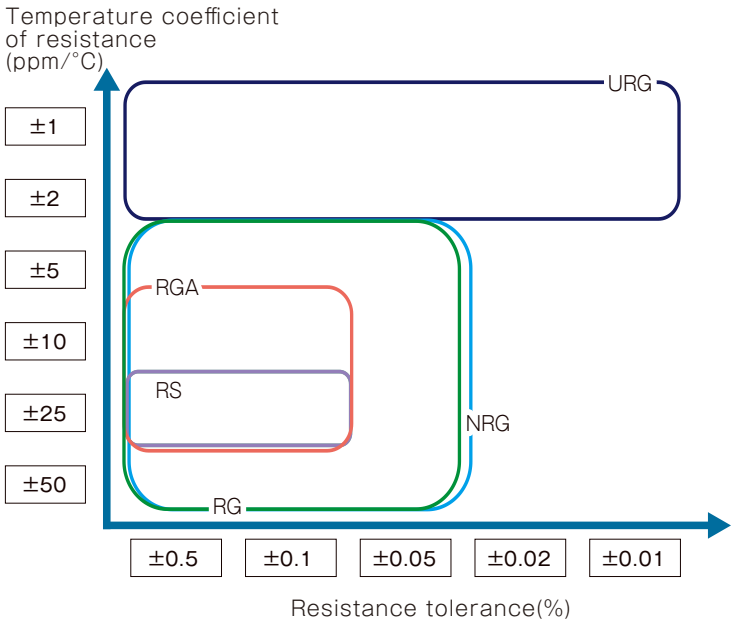


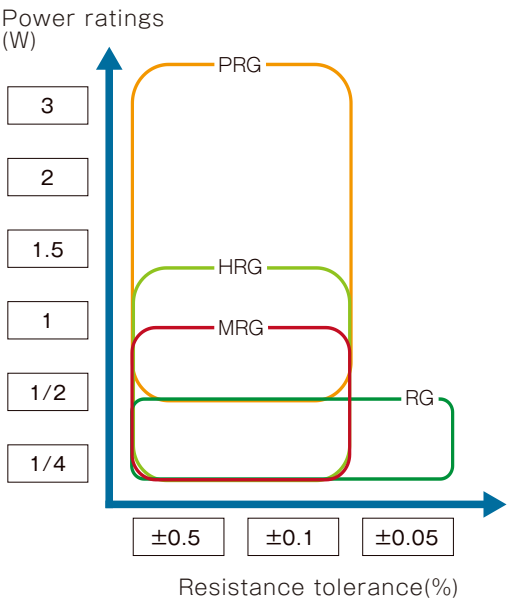
Map from discrete RG series to resistor networks



Thin film resistor map by performance

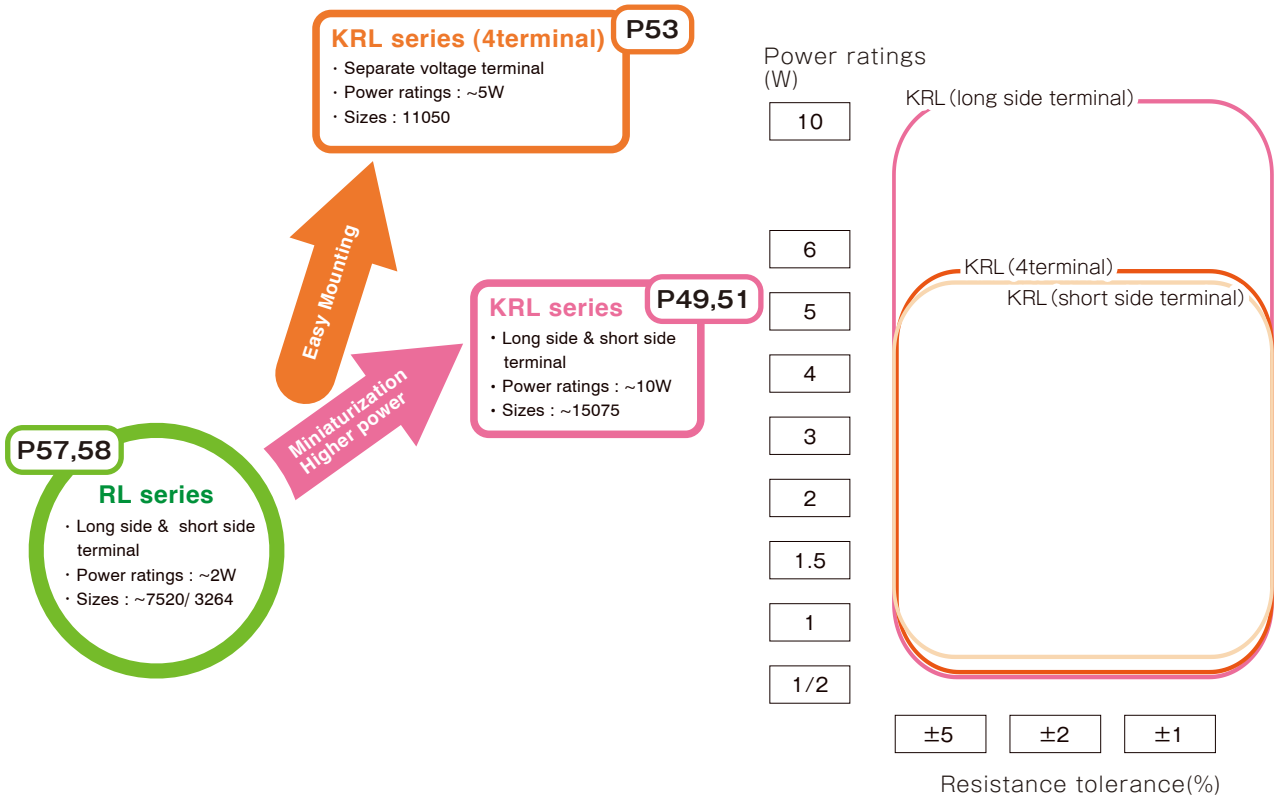
Thin film resistors are highly reliable and stable over long periods of time. The diagrams below show the matrix of Susumu's thin film resistors based on tolerance with TCR , and tolerance with power ratings.
The high power resistors are offered in two different terminal configurations; PRG series -long side terminal and HRG series - short side terminal, to meet your need for miniaturization using same power.





Current sensing chip resistors' relation map

The diagram below illustrates how we expanded our current sensing chip resistors in order to meet the need for miniaturization and high power ratings.
We also offer 4 terminal current sensor isolating voltage terminals, making it easier to mount on the board.
We will continue to expand current sensing chip resistor series corresponding the needs of the market.



E series resistance values (IEC designated series of resistance values)

series	Values														
E-6	1.0		1.5		2.2		3.3		4.7		6.8				
E-12	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2			
E-24	1.0	1.1	1.2	1.3	1.5	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						
E-96	1.00	1.02	1.05	1.07	1.10	1.13	1.15	1.18	1.21	1.24	1.27	1.30	1.33	1.37	1.40
	1.43	1.47	1.50	1.54	1.58	1.62	1.65	1.69	1.74	1.78	1.82	1.87	1.91	1.96	2.00
	2.05	2.10	2.15	2.21	2.26	2.32	2.37	2.43	2.49	2.55	2.61	2.67	2.74	2.80	2.87
	2.94	3.01	3.09	3.16	3.24	3.32	3.40	3.48	3.57	3.65	3.74	3.83	3.92	4.02	4.12
	4.22	4.32	4.42	4.53	4.64	4.75	4.87	4.99	5.11	5.23	5.36	5.49	5.62	5.76	5.90
	6.04	6.19	6.34	6.49	6.65	6.81	6.98	7.15	7.32	7.50	7.68	7.87	8.06	8.25	8.45
	8.66	8.87	9.09	9.31	9.53	9.76									

Three-letter codes for resistance value (Codes for Marking in E96 series)

(1) A manufacturing date code: Refer to JIS C 5201-1.
(2) Three digits of number shall be marked on the protective coating. In this case, the three digits of code number shall be added at the end of type designation.

(Example) 4.99KΩ = 499 × 10^1

Marking: 68H
Type designation: RR0816P-4991-D-68H

code	E96 value	code	E96 value	code	E96 value	code	E96 value	code	E96 value	code	E96 value	code	E96 value	code	E96 value
01	100*	13	133	25	178	37	237	49	316	61	422	73	562	85	750*
02	102	14	137	26	182	38	243	50	324	62	432	74	576	86	768
03	105	15	140	27	187	39	249	51	332	63	442	75	590	87	787
04	107	16	143	28	191	40	255	52	340	64	453	76	604	88	806
05	110*	17	147	29	196	41	261	53	348	65	464	77	619	89	825
06	113	18	150*	30	200*	42	267	54	357	66	475	78	634	90	845
07	115	19	154	31	205	43	274	55	365	67	487	79	649	91	866
08	118	20	158	32	210	44	280	56	374	68	499	80	665	92	887
09	121	21	162	33	215	45	287	57	383	69	511	81	681	93	909
10	124	22	165	34	221	46	294	58	392	70	523	82	698	94	931
11	127	23	169	35	226	47	301	59	402	71	536	83	715	95	953
12	130*	24	174	36	232	48	309	60	412	72	549	84	732	96	976

code for power of 10

code	power
A	10^0
H	10^1
C	10^2
D	10^3
E	10^4
F	10^5
R	10^{-1}
S	10^{-2}

* The resistance value duplicated in E24 series and in E96 series shall be manufactured in E24 series only.

Disclaimer and handling care of our products

Disclaimer

1. The contents of this catalogue are only for reference purposes and its contents may be changed without prior notification. Official specifications will be submitted to each customer. For ordering, please contact our sales representatives

2. The products listed in this catalogue are for general purpose electronic equipment. Please consult with us if you require specific qualities or reliability as in nuclear or aerospace applications.

3. When you incorporate our products in your design, please utilize them within their specified operating conditions such as rated power and recommended operating temperature. We cannot guarantee our products and cannot take responsibility for the failure of our products if they are used under improper conditions or outside of the parameters of our specified conditions.

4. No part of this publication may be reproduced by any means without the permission of Susumu Co. ltd.

Handling and care

< Consideration during mounting >

(1) Before, during and after mounting, take care not to damage the protective coating of the products. Damage to the protective coating may result in weakening the humidity tolerance.

(2) When using a soldering iron, the heat should be applied to the land pattern not directly to the component. The tip of the soldering iron should not touch the resistors directly. In addition, when the tip of the soldering iron is hot, please do soldering as quick as possible(Below 350℃ within 3 seconds).

(3) Flux residue can cause corrosion and electro-migration resulting in the deterioration of humidity tolerance. If you utilize highly activated flux, such as flux containing chlorine, please consult with us prior to usage.

(4) Ionized foreign material contamination or residue can also cause corrosion and electro-migration resulting in the deterioration of humidity tolerance. Do not touch the components with bare hands prior to or after mounting.

(5) If the soldering operation takes place at very high temperatures and for a prolonged period of time, the terminal may dissolve into the solder.

(6) Coating, sealing and embedding with resin or polymer
When mounted components are coated ,sealed with resin or polymer, or embedded into resin or polymer, the resin/polymer selection must consider heat tolerance, humidity tolerance, mechanical properties, and chemical or ion compositions. Certain resin materials may cause resistance drift during the curing process. Please get in touch with us in advance if you are using resin.

< Storage >

(1)Storage condition

When resistors are stored under sealed conditions with oxygen-depleting packing material, it is rare, but depending on the environment, the gas generated by the oxygen-depleting chemical may cause resistance change.

< Operating environment; condition>

(1)If these components are utilized for unusual conditions, the reliability and characteristics should be verified in advance. Such conditions include:

①Exposure of the component to water, salt water, oils, acids, alkaline, or solvents

②Exposure of the component to direct sunlight, outdoor weather conditions, or heavy dust

③Exposure to frost

④Possible exposure to corrosive air or gas such as a marine atmosphere, HCl, Cl_2, H_2S, NH_3, SO_2, and NOx.

(2)Usage under high temperatures and high humidity

①When components are used under high temperature conditions, assess the potential temperatures surrounding the components considering the other heat-producing neighboring components, and regulate your power usage following the specified derating curve.

②If the components are used under high humidity conditions or at temperatures below the dew point, the products can experience positive resistance drift or even an open circuit.

(3)Use our products under the rated power when the pulse current or voltage is applied. The peak voltage of the pulse should remain under the rated voltage.