



9/7/00

NIC COMPONENTS CORP.

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<http://www.niccomp.com>

Technical Inquiries: tpmg@niccomp.com

CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS

SERIES: NRC



NIC COMPONENTS CORP

NIPPON INDUSTRIES CO., LTD.

FAX NO.090600-2

DATE: SEPT 6, 2000

PAGE 1 OF 15

RE: RELIABILITY TEST DATA FOR CHIP RESISTORS (NRC SERIES)

FURTHER TO YOUR REQUIREMENT, WE ARE SENDING HERewith LATEST TEST DATA WHICH WERE MEASURED FOR FOLLOWING ITEMS:

- 1: TEMPERATURE CHARACTERISTIC OF RESISTANCE (HOT)**
- 2: TEMPERATURE CHARACTERISTIC OF RESISTANCE (COLD)**
- 3: TEMPERATURE CYCLING**
- 4: SHORT-TIME OVERLOAD**
- 5: ENDURANCE (RATED LOAD)**
- 6: ENDURANCE (UNDERDAMP AND LOAD)**
- 7: ROBUSTNESS OF TERMINATION**



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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS
 SERIES: NRC

TEMPERATURE CHARACTERISTIC OF RESISTANCE 抵抗温度特性(HOT)

LIMIT: NRC04 (J) (F) ±200PPM/°C
 OTHERS (J) ±200PPM/°C
 (F) ±100PPM/°C

NRC04	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	139.5	95.2	56.5	72.6	60.2	66.3
AVE	125.2	72.4	35.5	58.6	40.3	50.2
MIN	106.3	48.2	2.3	38.2	29.5	39.6

NRC06	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	52.3	51.4	20.5	54.5	41.5	45.7
AVE	30.2	38.6	6.8	30.5	19.6	35.5
MIN	15.5	29.4	-2.5	25.9	11.2	22.2

NRC10	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	57.5	48.0	32.0	48.6	38.5	33.9
AVE	45.3	35.6	26.3	38.7	35.2	22.6
MIN	29.6	22.3	18.2	28.9	31.5	15.5

NRC12	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	38.5	25.3	11.0	34.5	42.5	14.0
AVE	17.5	12.3	7.6	22.7	33.2	15.9
MIN	6.5	-14.3	3.0	15.8	21.8	7.0

NRC25	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	-6.5	8.2	33.5	65.2	22.5	32.5
AVE	-18.5	1.5	25.3	49.8	13.3	21.5
MIN	-25.2	-10.7	18.2	38.5	6.2	3.2

NRC50	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	13.1	6.6	49.3	72.3	48.6	45.2
AVE	1.3	-5.3	45.1	56.3	42.8	32.2
MIN	-12.2	-12.2	36.2	49.2	35.8	7.2

NRC100	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	-18.2	11.2	66.5	74.9	53.2	49.3
AVE	-39.5	2.8	49.3	47.3	45.5	35.4
MIN	-44.2	-12.3	41.1	45.2	33.8	17.2



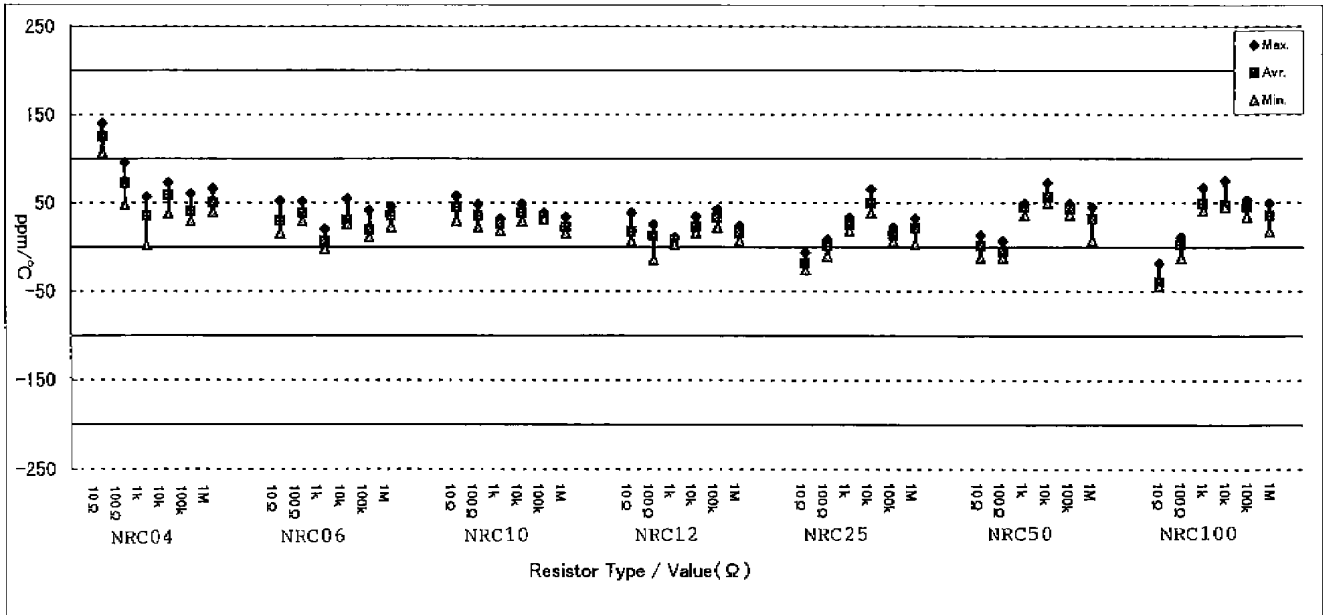
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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS
SERIES: NRC

Temperature Characteristic of Resistance TCR: 抵抗温度特性
JIS C 5202 5.2 Limit NRC04(J/F): ±200 (ppm/°C)
Others J: ±200, F: ±100 (ppm/°C)

Hot Side





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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS
 SERIES: NRC

➤ TEMPERATURE CHARACTERISTIC OF RESISTANCE 抵抗温度特性(COLD)

LIMIT: NRC04 (J) (F) ±200PPM/°C
 OTHERS (J) ±200PPM/°C
 (F) ±100PPM/°C

NRC04	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	182.30	115.50	43.50	102.20	23.40	21.60
AVE	154.20	86.50	25.80	92.50	6.60	-2.80
MIN	106.50	55.20	-13.50	63.70	-19.80	-21.40

NRC06	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	33.80	28.90	-22.40	-11.50	-8.60	-15.20
AVE	5.70	18.10	-38.20	-25.10	-25.90	-26.30
MIN	-16.70	-4.80	-52.20	-44.80	-44.20	-43.80

NRC10	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	-11.50	-8.60	-21.50	-29.40	-13.80	-26.70
AVE	-31.50	-29.60	-36.80	-9.50	-28.30	-43.70
MIN	-49.80	-48.80	-65.80	-55.80	-44.60	-58.40

NRC12	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	-25.60	-36.40	-14.40	-10.20	-5.50	-39.50
AVE	-45.10	-58.30	-25.20	-19.50	-20.60	-51.30
MIN	-51.80	-61.20	-48.30	-30.60	-38.80	-68.70

NRC25	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	-57.20	-38.20	12.90	18.30	-11.50	4.60
AVE	-62.40	-45.10	5.70	13.70	-38.10	-21.60
MIN	-71.60	-61.80	-22.80	2.10	-56.10	-53.70

NRC50	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	-42.60	-23.60	38.50	29.80	6.60	3.50
AVE	-59.80	-43.80	25.60	22.60	-16.20	-24.30
MIN	-69.20	-65.30	21.40	8.50	-35.80	-49.80

NRC100	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	-38.40	-28.30	66.90	46.20	32.10	-19.40
AVE	-62.60	-36.70	58.60	29.60	21.80	-31.80
MIN	-73.80	-52.80	41.80	16.70	-8.40	-46.20



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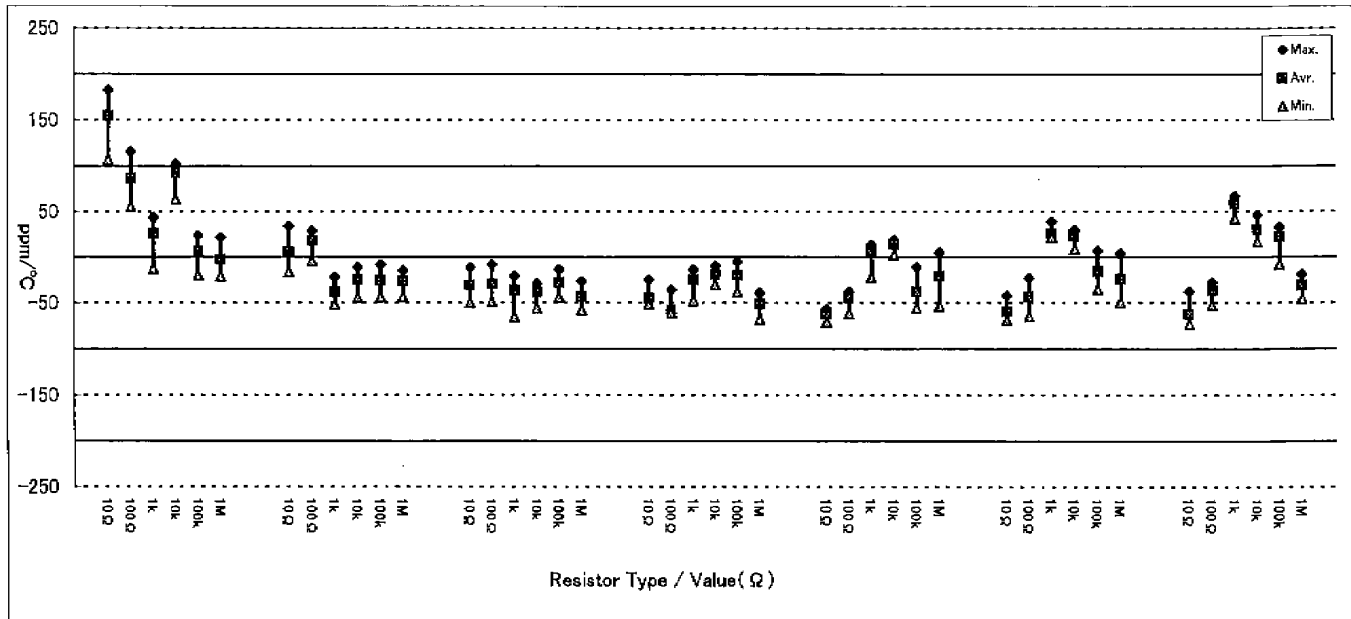
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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS
 SERIES: NRC

Z-7 Temperature Characteristic of Resistance TCR: 抵抗温度特性
 JIS C 5202 5.2 Limit NRC04(J/F): ±200 (ppm/°C)
 Others J: ±200, F: ±100 (ppm/°C)

Cold Side





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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS

SERIES: NRC

TEMPERATURE CYCLING LIMIT: $\pm(1.0\% + 0.05 \Omega)$

NRC04	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.07	0.04	0.04	0.03	0.04	0.03
AVE	0.05	0.02	0.02	0.00	0.01	0.00
MIN	0.03	0.00	-0.02	-0.03	-0.02	-0.04

NRC06	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.02	0.01	0.03	0.03	0.01	0.03
AVE	0.00	-0.02	0.00	0.01	-0.02	0.01
MIN	-0.04	-0.03	-0.01	-0.01	-0.03	-0.03

NRC10	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.04	0.03	0.02	0.01	0.04	0.04
AVE	0.01	0.00	0.00	0.00	0.01	0.02
MIN	-0.03	-0.02	-0.02	-0.02	-0.02	-0.01

NRC12	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.07	0.04	0.04	0.03	0.04	0.03
AVE	0.05	0.02	0.02	0.00	0.01	0.00
MIN	0.03	0.00	-0.02	-0.03	-0.02	-0.04

NRC25	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.06	0.05	0.04	0.05	0.06	0.06
AVE	0.01	0.03	0.01	0.03	0.03	0.05
MIN	-0.02	0.00	-0.02	0.00	0.01	0.03

NRC50	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.08	0.1	0.02	0.03	0.04	0.03
AVE	0.07	0.02	0.01	0.01	0.02	0.01
MIN	0.02	0.01	0.00	-0.02	0.00	-0.01

NRC100	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.04	0.05	0.06	0.04	0.02	0.0
AVE	0.02	0.03	0.02	0.02	0.01	0.02
MIN	0.00	-0.01	0.00	-0.02	0.00	0.01



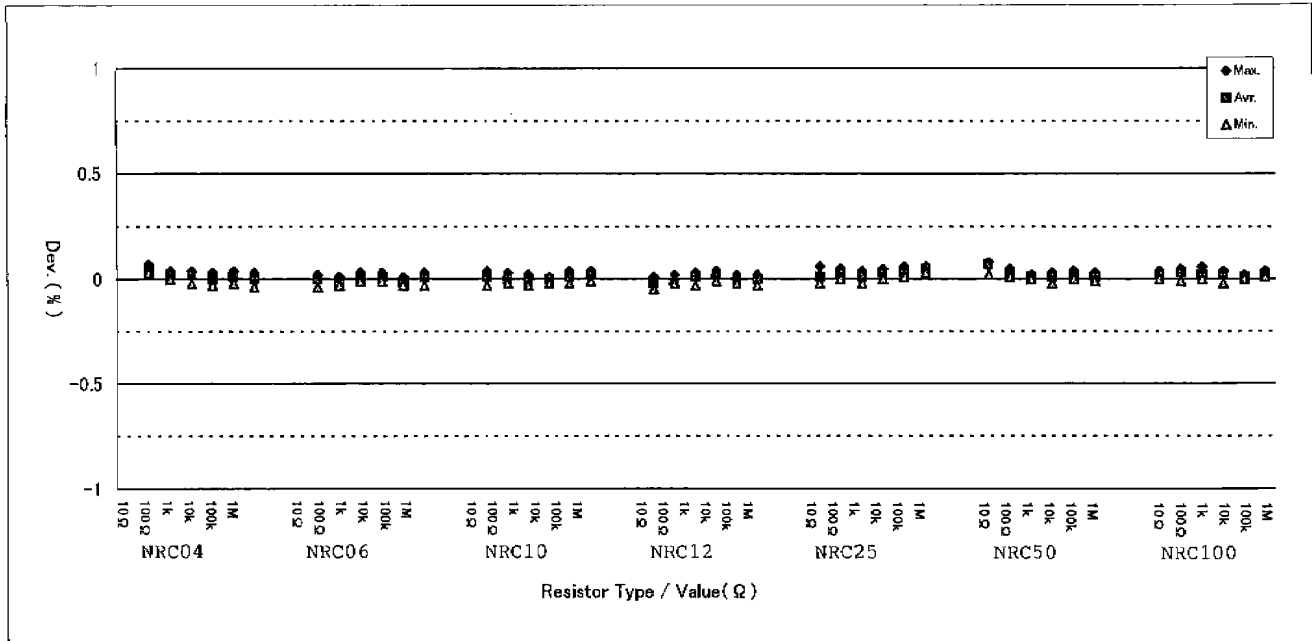
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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS
SERIES: NRC

3- / **Temperature Cycling** 温度サイクル
 JIS C 5202 7.4 Limit $\pm(1.0\%+0.05\Omega)$





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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS

SERIES: NRC

4) SHORT-TIME OVERLOAD

LIMIT: $\pm(2.0\% + 0.1 \Omega)$

NRC04	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.06	0.04	0.06	0.08	0.04	0.03
AVE	0.03	0.00	0.02	0.01	0.01	0.00
MIN	0.00	-0.11	-0.01	-0.02	-0.06	-0.05

NRC06	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.02	0.04	0.08	0.04	0.02	0.02
AVE	-0.01	0.01	0.00	0.01	-0.05	-0.05
MIN	-0.06	-0.03	-0.02	-0.01	-0.08	-0.07

NRC10	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	-0.01	0.13	0.02	0.06	0.08	0.06
AVE	-0.03	0.06	0.06	0.03	0.05	0.01
MIN	-0.07	-0.03	-0.03	0.00	0.01	-0.02

NRC12	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.01	0.02	-0.02	-0.01	0.02	0.08
AVE	-0.02	0.00	-0.04	-0.02	0.01	0.05
MIN	-0.04	-0.01	-0.10	-0.06	-0.03	0.01

NRC25	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.02	0.05	0.11	0.05	0.04	0.02
AVE	-0.02	0.00	0.00	0.02	0.00	0.00
MIN	-0.06	-0.05	-0.05	-0.09	-0.05	-0.02

NRC50	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.10	0.12	0.03	0.04	0.09	0.10
AVE	0.05	0.08	-0.05	-0.05	0.06	-0.02
MIN	0.02	-0.05	-0.12	-0.12	-0.03	-0.06

NRC100	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.05	0.08	0.06	0.11	0.09	0.06
AVE	-0.05	-0.01	0.01	0.06	0.01	0.04
MIN	-0.10	-0.09	-0.13	-0.06	-0.06	-0.09



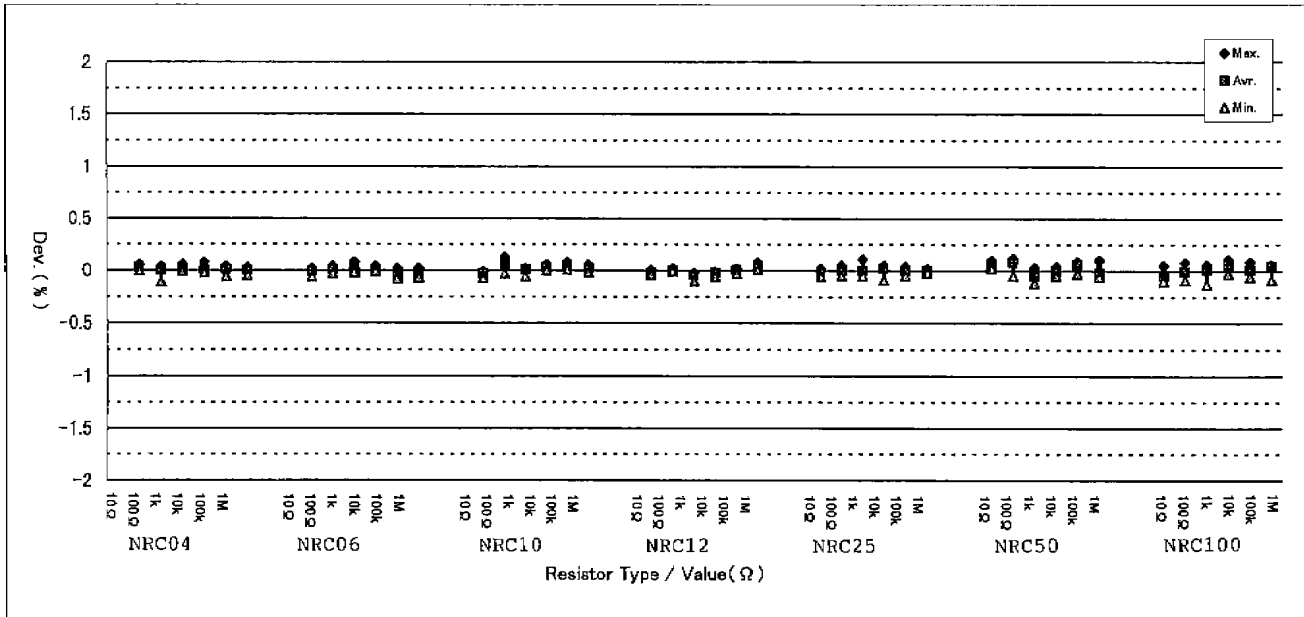
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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS
 SERIES: NRC

A-1 Short-time Overload 短時間過負荷特性
 JIS C 5202 5.5 Limit $\pm(2.0\%+0.1\Omega)$





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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS
 SERIES: NRC

ENDURANCE (RATED LOAD)

LIMIT: $\pm(3.0\% + 0.1\Omega)$

NRC04	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.05	0.09	0.01	-0.03	0.15	0.00
AVE	0.00	0.02	-0.03	-0.12	0.08	-0.06
MIN	-0.09	0.00	-0.11	-0.22	-0.16	-0.26

NRC06	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.02	0.05	0.02	0.09	0.08	0.28
AVE	-0.02	-0.05	-0.13	0.02	0.01	0.14
MIN	-0.19	-0.18	-0.35	-0.14	0.24	0.02

NRC10	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.08	0.11	0.03	0.04	0.02	0.15
AVE	0.02	0.02	0.00	-0.16	-0.21	0.03
MIN	0.00	-0.06	-0.05	-0.29	-0.38	-0.05

NRC12	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.02	0.04	0.03	0.06	0.08	0.09
AVE	0.00	0.02	0.02	0.03	0.05	0.05
MIN	-0.08	-0.07	0.00	0.01	-0.06	0.00

NRC25	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.03	0.12	-0.03	-0.01	0.07	0.00
AVE	0.00	0.03	-0.09	-0.05	0.00	-0.06
MIN	-0.08	-0.09	-0.16	-0.21	-0.11	-0.15

NRC50	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.05	0.02	0.06	0.01	0.05	-0.05
AVE	-0.06	-0.09	0.01	-0.09	-0.10	-0.21
MIN	-0.09	-0.19	-0.07	-0.24	-0.33	-0.34

NRC100	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.10	0.00	0.10	0.03	0.16	0.04
AVE	0.02	-0.04	0.02	-0.08	0.06	-0.08
MIN	-0.08	-0.15	-0.13	-0.16	-0.08	-0.22



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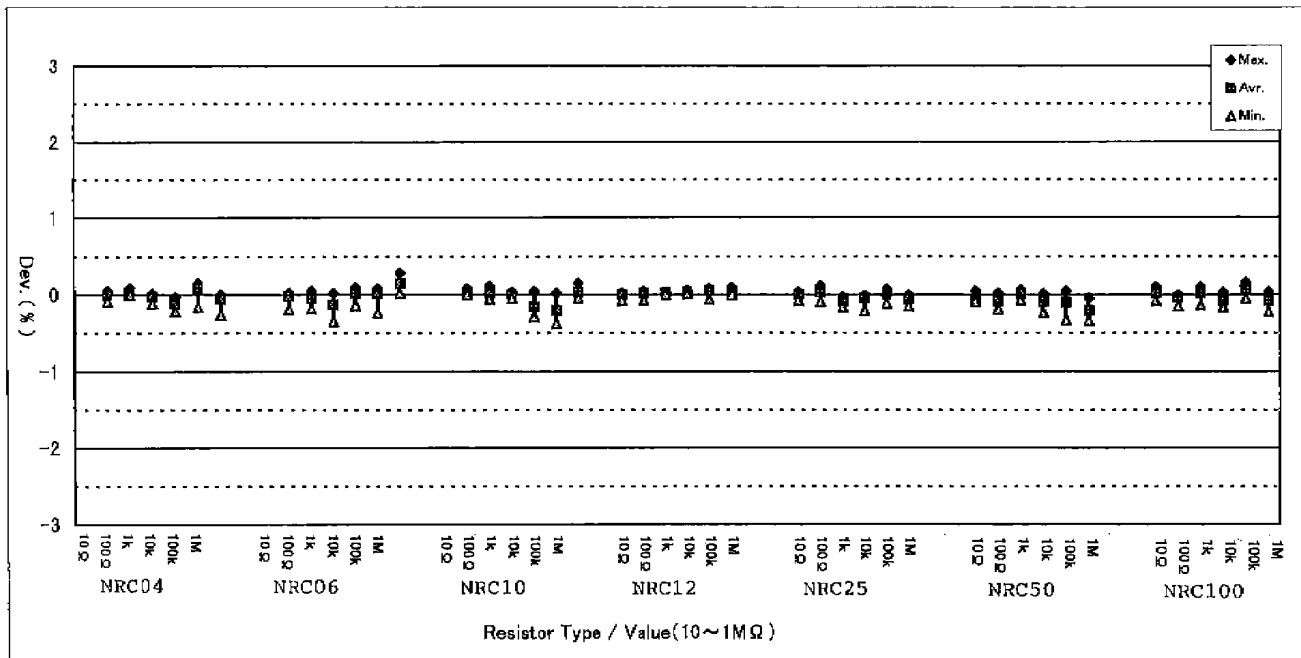
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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS
 SERIES: NRC

5-1/

Endurance (rated load) 定格負荷特性
 JIS C 5202 7.10 Limit $\pm(3.0\%+0.1\Omega)$





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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS
SERIES: NRC

67 ENDURANCE (UNDER DAMP AND LOAD) LIMIT: $\pm(3.0\% + 0.1\Omega)$

NRC04	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.07	0.09	0.06	0.02	0.06	0.08
AVE	-0.02	0.00	-0.02	-0.03	0.00	-0.01
MIN	-0.06	-0.05	-0.10	-0.12	-0.10	-0.08

NRC06	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.01	-0.01	0.10	0.05	0.06	0.20
AVE	-0.06	-0.09	0.00	0.00	0.01	0.00
MIN	-0.10	-0.20	-0.15	-0.06	-0.12	-0.06

NRC10	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.05	0.10	0.22	0.03	0.00	0.10
AVE	-0.08	0.01	0.02	0.02	-0.10	0.02
MIN	-0.13	-0.08	-0.04	-0.04	-0.25	-0.14

NRC12	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.12	0.03	0.10	0.02	0.06	0.23
AVE	0.03	-0.05	0.04	-0.15	0.00	0.08
MIN	-0.09	-0.20	-0.08	-0.19	-0.12	0.03

NRC25	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.06	0.00	0.02	0.15	0.08	0.26
AVE	0.01	-0.12	-0.13	0.03	-0.08	0.06
MIN	-0.11	-0.25	-0.32	-0.14	-0.22	-0.14

NRC50	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.24	0.12	0.02	0.02	0.05	0.05
AVE	0.11	-0.03	-0.04	-0.04	0.01	-0.14
MIN	-0.15	-0.26	-0.09	-0.09	-0.09	-0.19

NRC100	10 Ω	100 Ω	1K Ω	10K Ω	100K Ω	1M Ω
MAX	0.08	0.10	0.04	0.06	-0.02	-0.03
AVE	0.02	0.02	0.01	0.02	-0.06	-0.26
MIN	-0.16	-0.06	-0.02	0.00	-0.21	-0.38



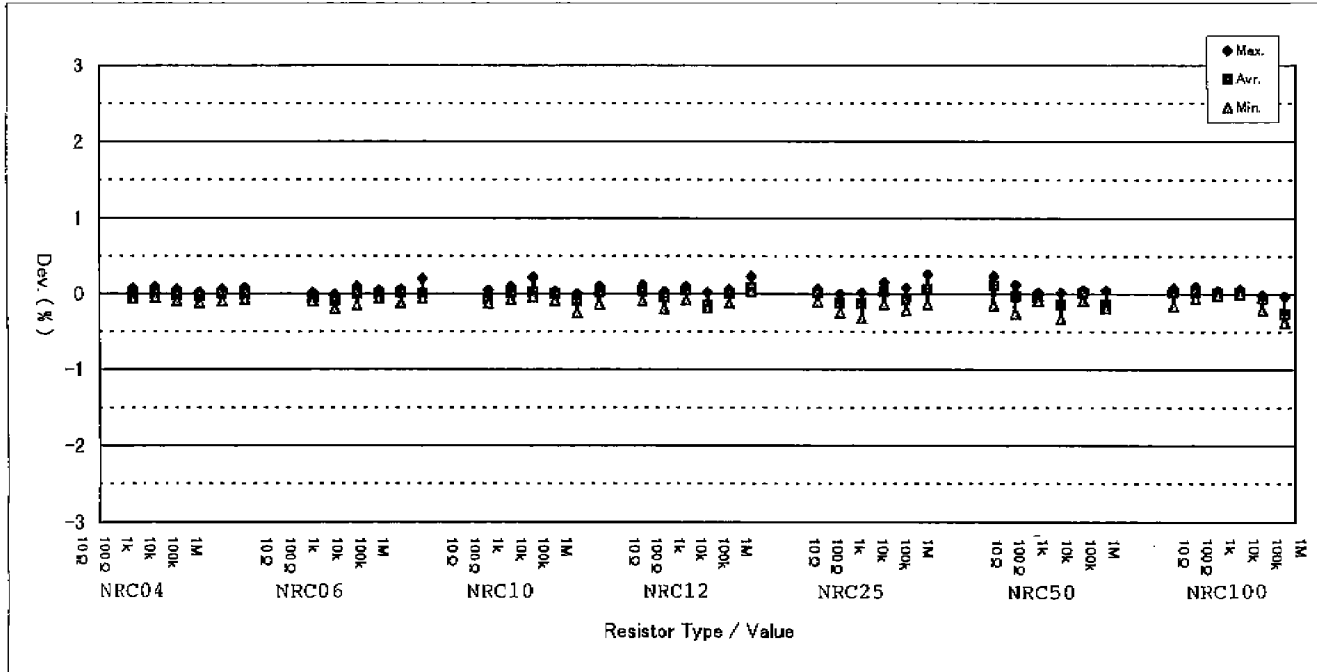
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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS
 SERIES: NRC

δ-1) Endurance (under damp load) 耐湿負荷特性
 JIS C 5202 7.9 Limit ±(3.0%+0.1Ω)





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CHARACTERISTICS TEST DATA

PRODUCTS: SMT THICK FILM CHIP RESISTORS
SERIES: NRC

7) ROBUSTNESS OF TERMINATION RESISTANCE VALUE 1K Ω
 LIMIT: ±(1.0%+0.05 Ω)

	NRC06	NRC10	NRC12	NRC25
MAX	0.08	0.06	0.13	0.08
AVE	0.02	0.03	0.08	0.04
MIN	0.00	0.00	0.00	0.00

7-1) Robustness of Termination 端子強度
 JIS C 5202 6.1.4 Limit ±(1.0%+0.05 Ω)

