

Data Sheet

Customer:

Product: Automotive Grade Metal Film Precision High Voltage
MELF Resistor - CSRP Series (Brown)

Size: 0204/0207

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VIKING TECH CORPORATION
光頤科技股份有限公司

No.70 Guangfu N. Rd., Hukou
Township, Hsinchu County 303,
Taiwan

TEL:886-3-5972931
FAX:886-3-5972935•886-3-5973494
E-mail:sales@viking.com.tw

VIKING TECH CORPORATION KAOHSIUNG BRANCH
光頤科技股份有限公司高雄分公司

No.248-3, Sin-Sheng Rd., Cian-Jhen Dist., Kaohsiung,
806, Taiwan

TEL:886-7-8217999
FAX:886-7-8228229
E-mail:sales@viking.com.tw

VIKING ELECTRONICS (WUXI) CO., LTD.
光頤電子(無錫)有限公司

No.22 Xixia Road, Machinery & Industry Park,
National Hi-Tech Industrial Development Zone
of Wuxi, Wuxi, Jiangsu Province, China
Zip Code:214028

TEL:86-510-85203339
FAX:86-510-85203667•86-510-85203977
E-mail:china@viking.com.tw

Produced by (QC)	Checked (QC)	Approved by (QC)	Prepared by (Sales)	Accepted by (Customer)
11-Sep-21	11-Sep-21	11-Sep-21		
Susan Huang	J.C. Liu	J.C. Liu		

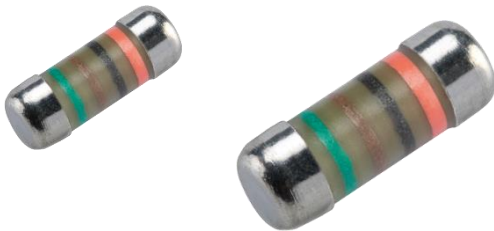
Automotive Grade Metal Film Precision High Voltage MELF Resistor

Features

- AEC-Q200 Compliance
- Thin film technology
- High voltage application
- Sn termination on Ni barrier layer
- Tight tolerance down to $\pm 0.1\%$
- High power rating up to 1 Watts
- SMD enabled structure
- Lead-free and RoHS compliant

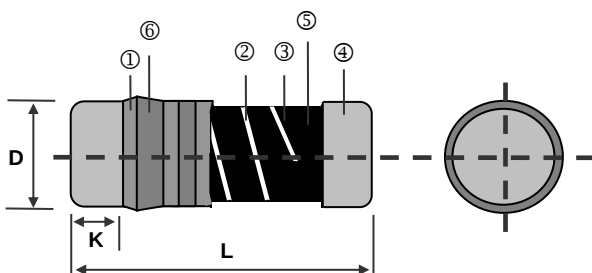
Applications

- Industrial
- Telecommunication
- Medical Equipment
- Measurement/Testing Equipment



TECHNICAL SPECIFICATIONS		
DESCRIPTION	CSRP0204	CSRP0207
Resistance range	340K Ω -3.4M Ω	340K Ω -3.4M Ω
Resistance tolerance	$\pm 1\%; \pm 0.5\%; \pm 0.25\%; \pm 0.1\%$	
Temperature coefficient	$\pm 50\text{ppm}/^\circ\text{C}; \pm 25\text{ppm}/^\circ\text{C}$	
Power rating P ₇₀	2/5W	1W
Operating voltage U _{max.}	500V	1000V
Operating temperature range	$-55^\circ\text{C} \sim 155^\circ\text{C}$	
Max. resistance change at P70 for resistance range, $\Delta R/R$ max., after 1000 h	$\leq 0.5\%$	$\leq 0.5\%$

Construction & Dimension



Type	L (mm)	ΦD (mm)	K (mm)	Weight 1,000EA (g)
CSRP0204	3.50 ± 0.2	1.40 ± 0.15	0.8 ± 0.1	18.7
CSRP0207	5.90 ± 0.2	2.20 ± 0.20	1.3 ± 0.1	80.9

① Insulation Coating	④ Electrode Cap
② Trimming Line	⑤ Resistor Layer
③ Ceramic Rod	⑥ Marking

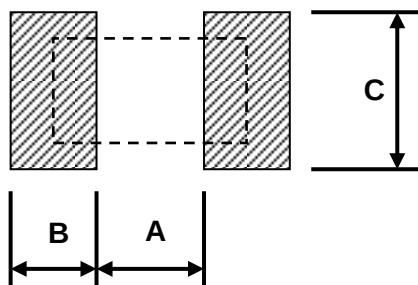
Part Numbering

Part Number : CSRP0204FTDG1004

C	S	R	P	0	2	0	4	D	T	D	G	1	0	0	4
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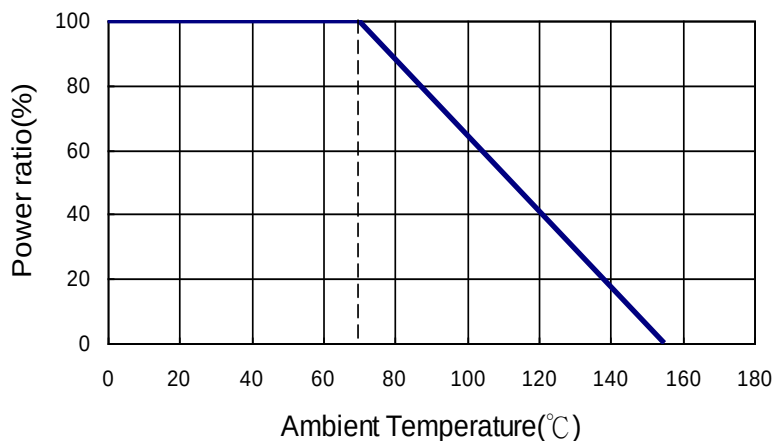
Product Type	Dimensions (L×ΦD)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance
CSRP	0204: 3.5x1.4 0207: 5.9x2.2	B: ±0.1% C: ±0.25% D: ±0.5% F: ±1%	T: Taping Reel	C: ±25 D: ±50	T: 1W G: 2/5W	1004: 1MΩ

Recommend Land Pattern

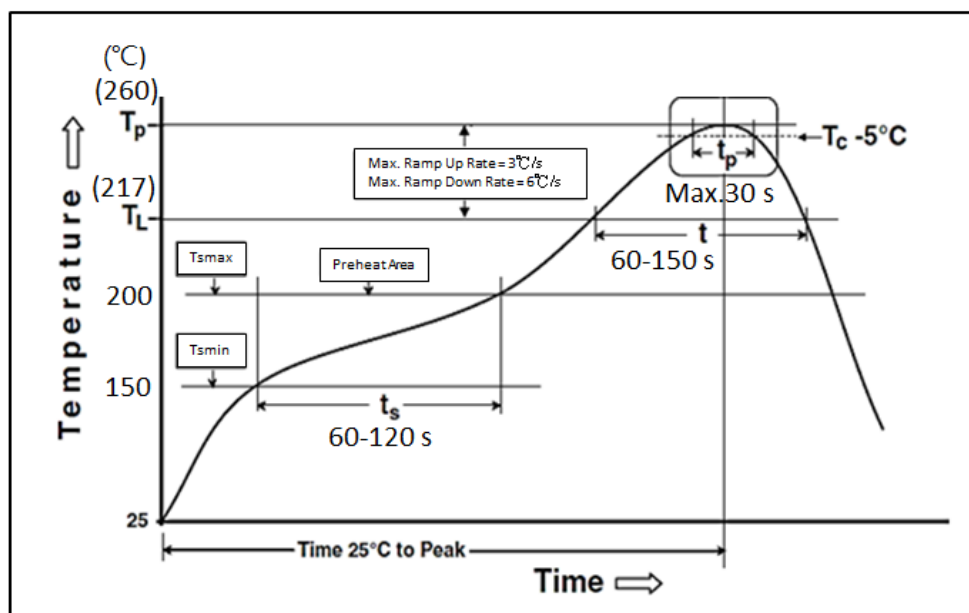


Type	A (mm)	B (mm)	C (mm)
CSRP0204	1.6	1.2	1.6
CSRP0207	3.0	1.7	2.4

Derating Curve



Soldering Condition (IPC/JEDEC J-STD-020)



Electrical Specifications

Item Type	Power Rating at 70 °C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range				TCR (PPM/°C)
					±0.1% (E24,E96)	±0.25% (E24,E96)	±0.5% (E24,E96)	±1% (E24,E96)	
0204	2/5W	-55 ~ +155°C	500V	1000V	340KΩ-1MΩ		340KΩ-3.4MΩ		±25
					340KΩ-1MΩ		340KΩ-3.4MΩ		±50
0207	1W	-55 ~ +155°C	1000V	2000V	340KΩ-1MΩ		340KΩ-3.4MΩ		±25
					340KΩ-1MΩ		340KΩ-3.4MΩ		±50

Operating Voltage= $\sqrt{P \cdot R}$ or Max. Operating Voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. Overload Voltage listed above, whichever is lower.

RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$ or Max. Operating Voltage whichever is lower.

■ Viking is capable of manufacturing the optional spec based on customer's requirement.

Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec	JIS-C-5201-1 4.8 IEC-60115-1 4.8 At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature
Short Time Overload	±(0.15%+0.05Ω)	JIS-C-5201-1 4.13 IEC-60115-1 4.13 RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds
Insulation Resistance	≥10G	JIS-C-5201-1 4.6 IEC-60115-1 4.6 Max. Overload Voltage for 1 minute
Endurance	±(1%+0.05Ω)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1 MIL-STD-202 Method 108 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
Biased Humidity	±(1%+0.05Ω)	MIL-STD-202 Method 103 1000 hrs 85°C/85%RH 10% of operating power. (≤100 V)
High Temperature Exposure	±(1%+0.05Ω)	MIL-STD-202 Method 108 at +155°C for 1000 hrs
Board Flex	±(0.5%+0.05Ω)	AEC-Q200-005 Bending once for 60 seconds with 2mm
Solderability	95% min. coverage	JIS-C-5201-1 4.17 IEC-60115-1 4.17 J-STD-002 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.25%+0.05Ω)	MIL-STD-202 Method 210 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover	JIS-C-5201-1 4.7 IEC-60115-1 4.7 1.42 times Max. Operating Voltage for 1 minute
Leaching	Individual leaching area ≤5% Total leaching area ≤10%	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 260±5°C for 30 seconds
Temperature Cycling	±(0.5%+0.05Ω)	JESD22 Method JA-104 -55°C to +125°C, 1000 cycles
Resistance to Solvents	No visible damage on appearance and marking.	MIL-STD-202 Method 215 Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.

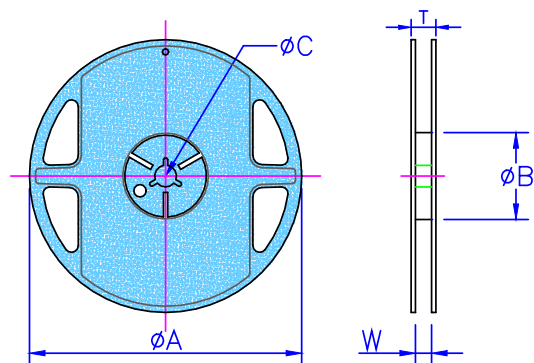
Metal Film Precision High Voltage MELF Resistor

Item	Requirement	Test Method
Mechanical Shock	$\pm(0.25\%+0.01\Omega)$	MIL-STD-202 Method 213 Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	$\pm(0.5\%+0.01\Omega)$	MIL-STD-202 Method 204 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	$\pm(0.5\%+0.01\Omega)$	AEC-Q200-002 Human body, 0204:2KV; 0207:4KV
Terminal Strength	No broken	AEC-Q200-006 Force of 1.8kg for 60 seconds.
Flammability	No ignition of the tissue paper or scorching or the pinewood board	UL-94 V-0 or V-1 are acceptable. Electrical test not required.

RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$ or Max. Operating Voltage whichever is lower.

■Storage Temperature: 15~28°C; Humidity < 80%RH

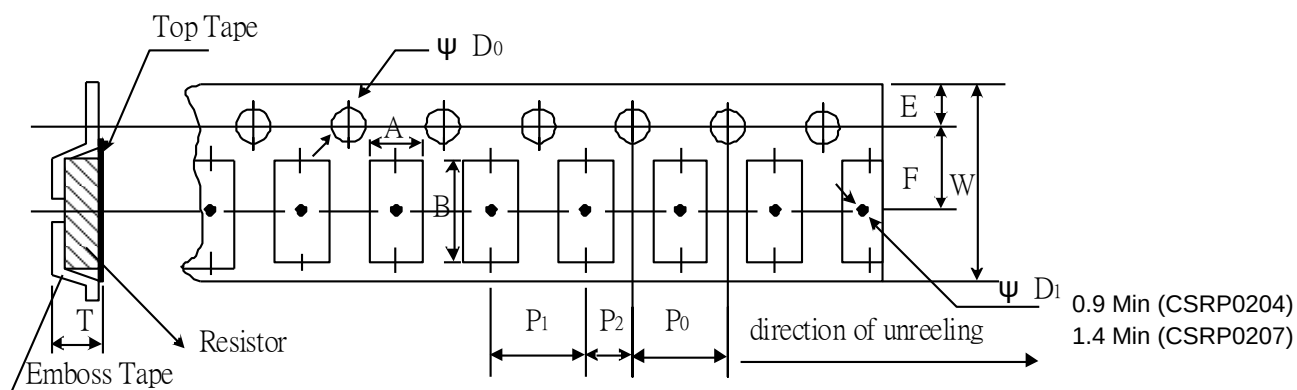
■ Packaging



Packaging Quantity & Reel Specifications

Type	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)	Emboss Plastic Tape (EA)
CSRP0204	7 inch	178.5±1.5	60.0+1.0	13.0±0.2	9.0±0.5	12.5±0.5	3,000
CSRP0207	7 inch	178.5±1.5	60.0+1.0	13.0±0.5	13.0±0.5	15.5±0.5	2,000

Emboss Plastic Tape Specifications

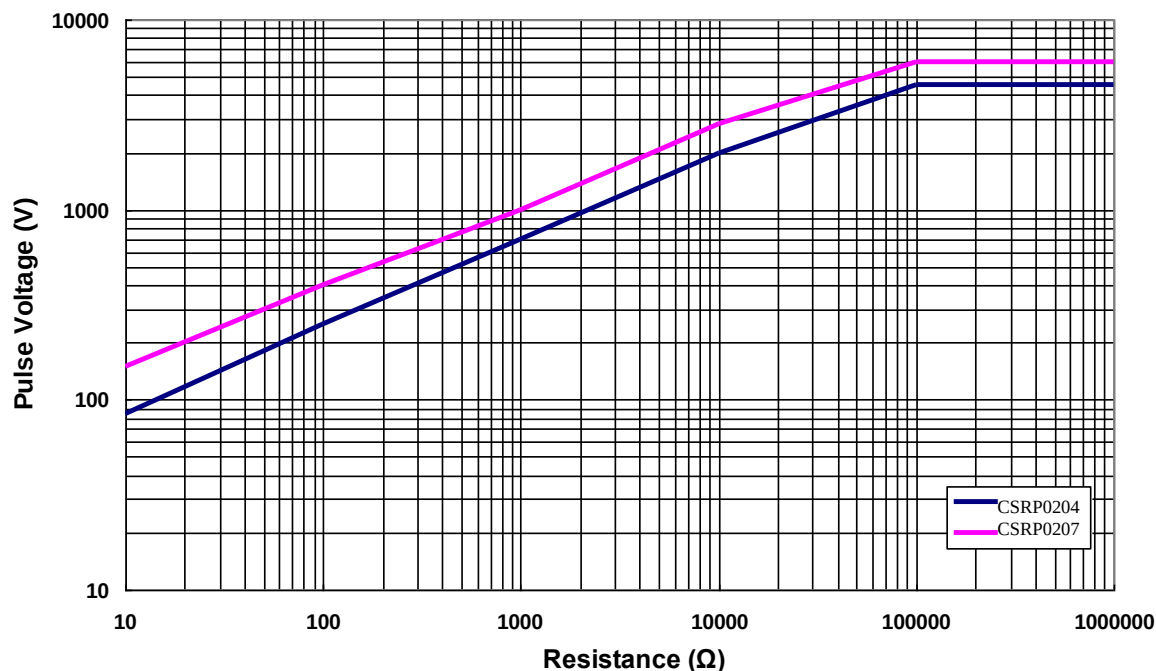


Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P ₀ (mm)	P ₁ (mm)	P ₂ (mm)	ΦD ₀ (mm)	T (mm)
CSRP0204	1.55±0.10	3.65±0.10	8.0±0.10	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.10	1.80±0.10
CSRP0207	2.40±0.10	6.15±0.10	12.0±0.10	1.75±0.10	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.10	2.70±0.10

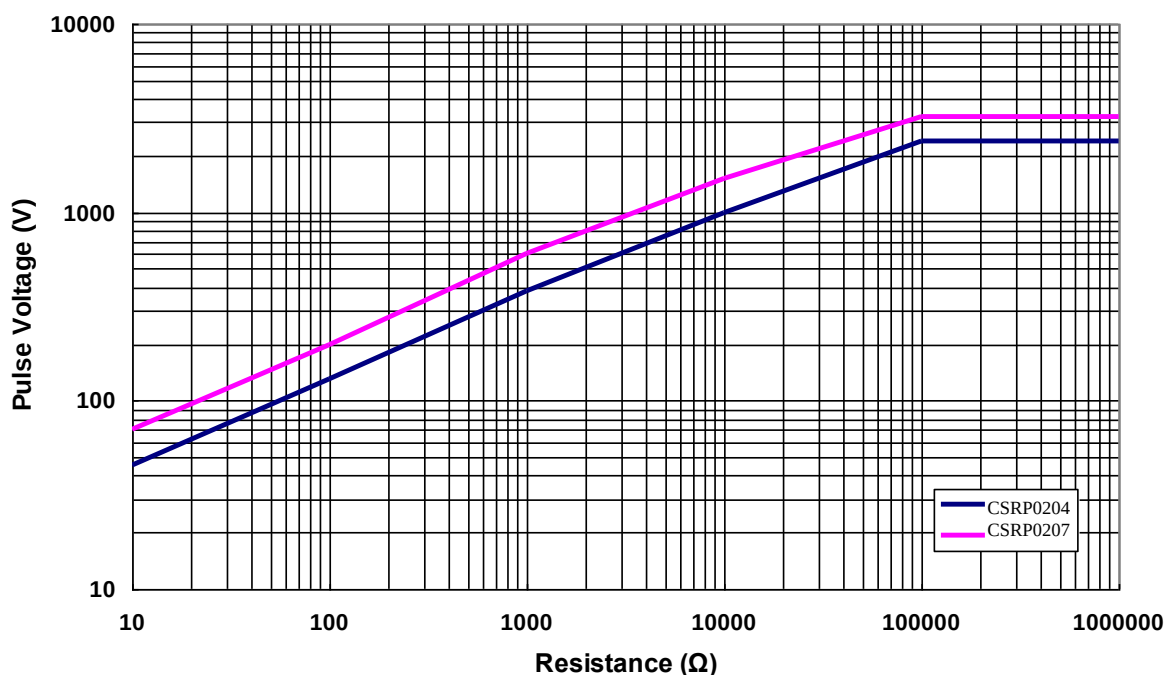
■ Lightning Surge

Resistors are tested in accordance with IEC 60115-1 using both 1.2/50 μ s and 10/700 μ s pulse shapes. The limit of acceptance is a shift in resistance of less than 0.5% from the initial value.

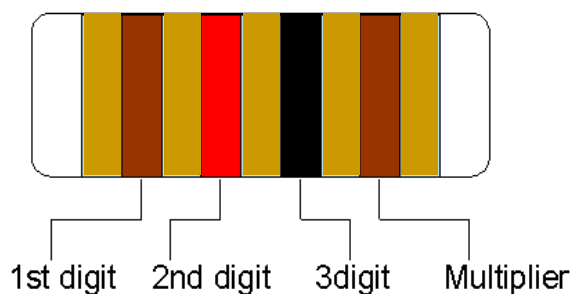
1.2/50 μ s Lightning Surge



10/700 μ s Lightning Surge



■ Marking & Resistance Tolerance



±1%	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
±0.5% ±0.25% ±0.1%	E-192	10.0	10.1	10.2	10.4	10.5	10.6	10.7	10.9	11.0	11.1	11.3	11.4	11.5	11.7	11.8	12.0	12.1	12.3	12.4	12.6	12.7	12.9	13.0	13.2
		13.3	13.5	13.7	13.8	14.0	14.2	14.3	14.5	14.7	14.9	15.0	15.2	15.4	15.6	15.8	16.0	16.2	16.4	16.5	16.7	16.9	17.2	17.4	17.6
		17.8	18.0	18.2	18.4	18.7	18.9	19.1	19.3	19.6	19.8	20.0	20.3	20.5	20.8	21.0	21.3	21.5	21.8	22.1	22.3	22.6	22.9	23.2	23.4
		23.7	24.0	24.3	24.6	24.9	25.2	25.5	25.8	26.1	26.4	26.7	27.1	27.4	27.7	28.0	28.4	28.7	29.1	29.4	29.8	30.1	30.5	30.9	31.2
		31.6	32.0	32.4	32.8	33.2	33.6	34.0	34.4	34.8	35.2	35.7	36.1	36.5	37.0	37.4	37.9	38.3	38.8	39.2	39.7	40.2	40.7	41.2	41.7
		42.2	42.7	43.2	43.7	44.2	44.8	45.3	45.9	46.4	47.0	47.5	48.1	48.7	49.3	49.9	50.5	51.1	51.7	52.3	53.0	53.6	54.2	54.9	55.6
		56.2	56.9	57.6	58.3	59.0	59.7	60.4	61.2	61.9	62.6	63.4	64.2	64.9	65.7	66.5	67.3	68.1	69.0	69.8	70.6	71.5	72.3	73.2	74.1
		75.0	75.9	76.8	77.7	78.7	79.6	80.6	81.6	82.5	83.5	84.5	85.6	86.6	87.6	88.7	89.8	90.9	92.0	93.1	94.2	95.3	96.5	97.6	98.8

Color	Digit	Multiplier
Silver	-	10^{-2}
Gold	-	10^{-1}
Black	0	10^0
Brown	1	10^1
Red	2	10^2
Orange	3	10^3
Yellow	4	10^4
Green	5	10^5
Blue	6	10^6
Violet	7	10^7
Grey	8	10^8
White	9	10^9