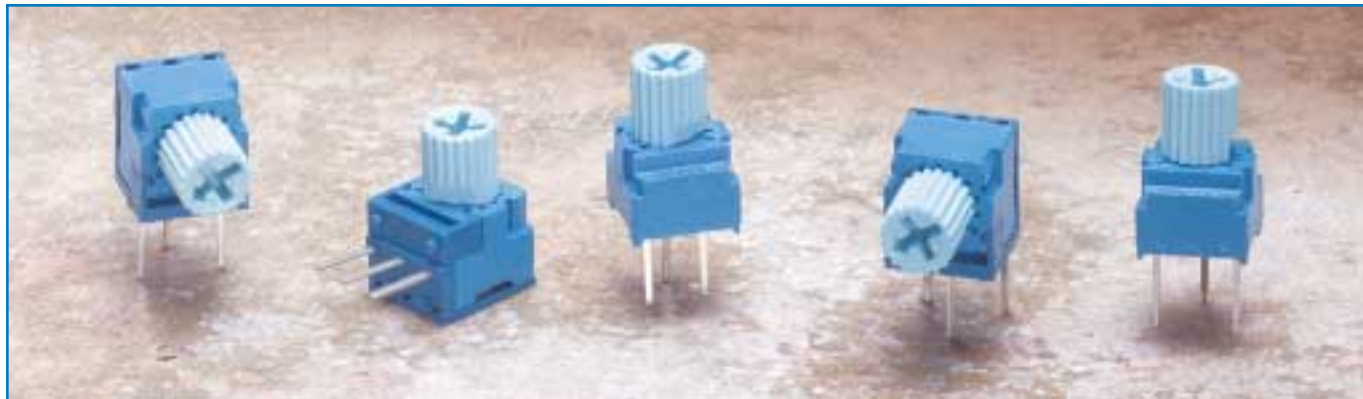


1/4" Square, Single-Turn, Through-Hole Sealed Cermet Trimmers



Features

- 1/4" square, single-turn, through-hole, sealed cermet trimmers
- Top and side adjust styles available
- Knob on all models for convenient fingertip adjustment
- Same design and housing sizes as GF063 series
- Precious metal, multi-contact wiper design
- Meets UL 94V-0 flammability requirements
- Sealed to withstand immersion cleaning processes
- Tape and ammo box available for PK, P1K and UK models

Specifications

Electrical

Standard Resistance Range	10Ω to 5MΩ (standard 1, 2 & 5 sequence)
Resistance Tolerance	±10% and ±20%
End Resistance	1% or 1Ω, whichever is greater
Resistance Taper	Linear
Peak Noise (C.R.V.)	1% or 1Ω, whichever is greater
Power Rating	0.5 watt at +70°C, 0 watt at +125°C
Maximum Input Voltage	250VDC or power rating, whichever is smaller
Temperature Coefficient	±100ppm/°C
Insulation Resistance	1,000MΩ minimum at 500VDC
Dielectric Strength	900VAC, 1 minute
Adjustment Travel	210° ± 10°

Mechanical

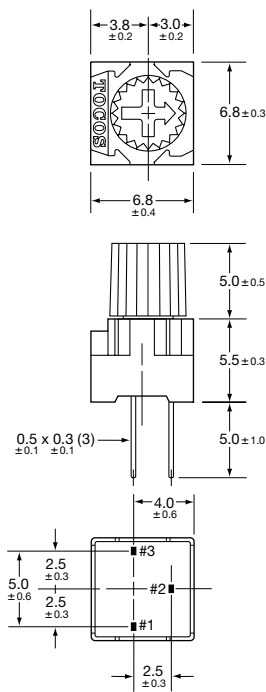
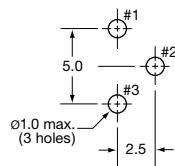
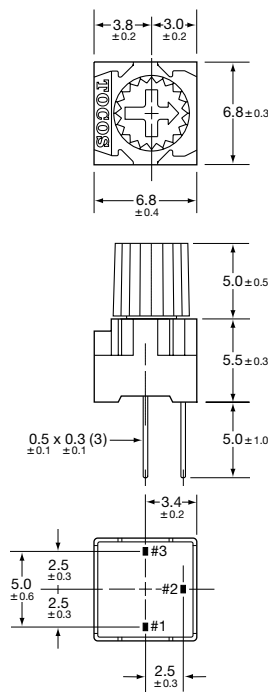
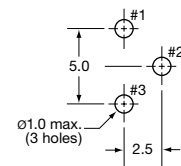
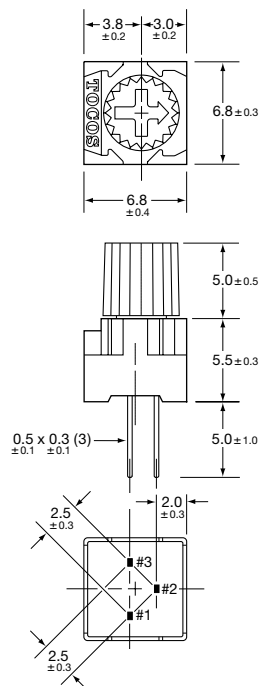
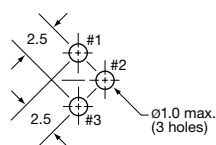
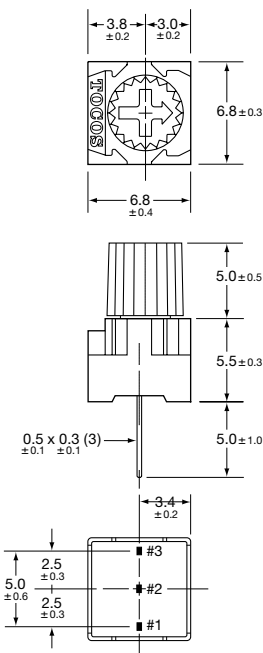
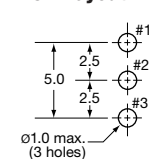
Mechanical Travel	250° ± 10°
Shaft Torque	200 gf•cm (2.77 oz•in) max.
Stop Strength	500 gf•cm (6.93 oz•in) min.
Flammability of Plastic Materials	Meets UL 94V-0
Nominal Weight	0.54g (PK, P1K, WK, UK) 0.64g (SK, S1K, XK, X1K, VK, V1K)
Marking	Resistance code, date code, model type

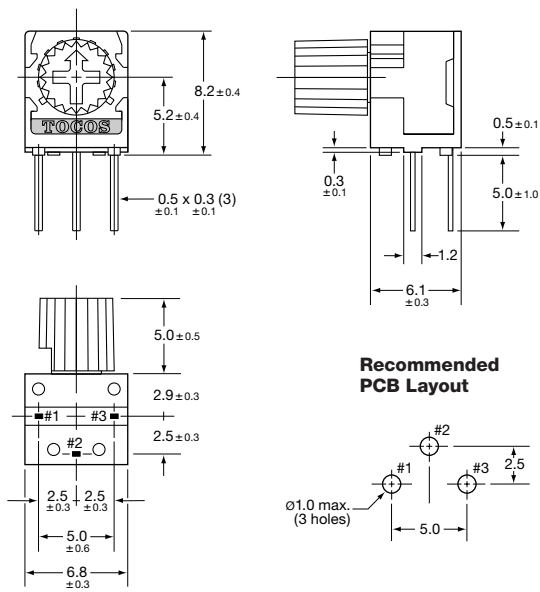
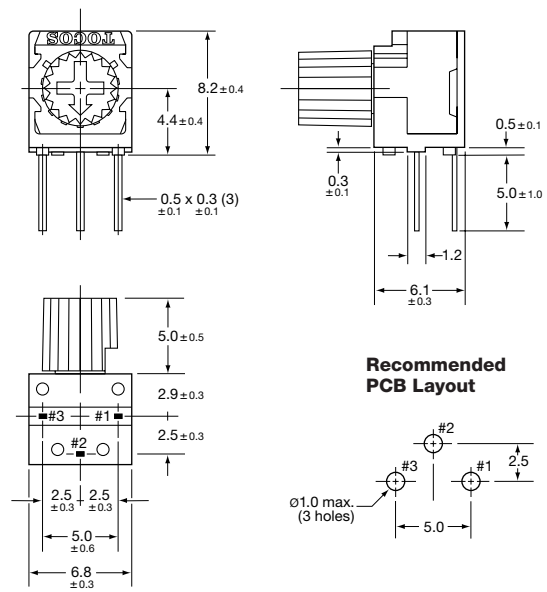
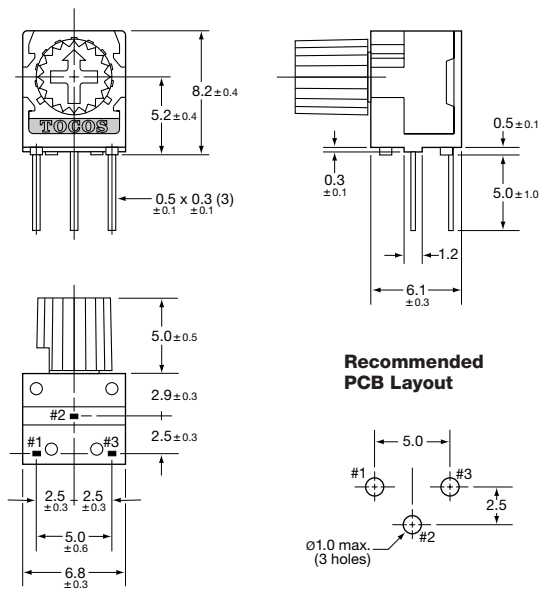
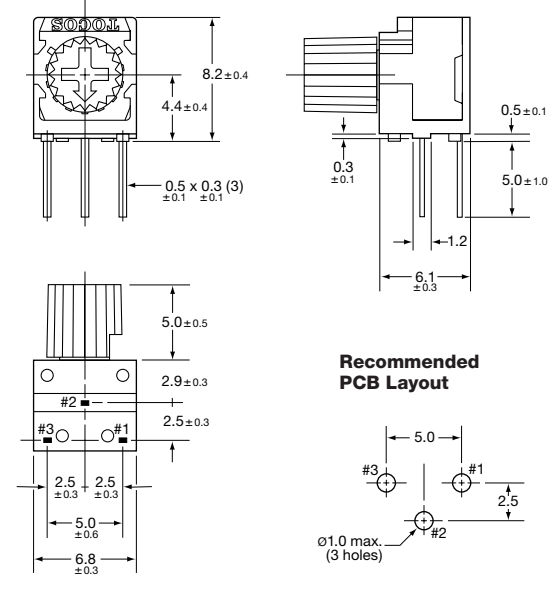
All GF063-K models are available without knobs.
Refer to GF063 Series on page 56.

Environmental

Temperature Range	–55°C to +125°C
Low Temperature Operation	–55°C, 0.5 watt, 2 hours ΔT/R ≤ ±2%, S.S. ≤ ±2%
High Temperature Exposure	+125°C, 250 hours ΔT/R ≤ ±2%, S.S. ≤ ±2%
Load Life	+70°C, 0.5 watt, 1,000 hours ΔT/R ≤ ±3%, S.S. ≤ ±2%
Thermal Shock	–55°C, +125°C, 30 minutes each, 5 cycles ΔT/R ≤ ±1%, S.S. ≤ ±1%
Shock	100G, 6ms, 6 directions, 3 times each ΔT/R ≤ ±1%, S.S. ≤ ±1%
Vibration	10-2,000Hz, 1.5mm amplitude, 20G, 12 hours ΔT/R ≤ ±1%, S.S. ≤ ±1%
Humidity	+40°C, 90-95%RH, 0.5 watt, 500 hours ΔT/R ≤ ±3%, S.S. ≤ ±2%
Moisture Resistance	–10°C to +65°C, 80-98%RH, 0.5 watt, 10 cycles, 240 hours ΔT/R ≤ ±2%
Soldering Heat Resistance	350°C, 3 seconds ΔT/R ≤ ±1%
Seal Test	+85°C, hot water for 1 minute
Rotational Life	100 cycles without discontinuity ΔT/R ≤ ±(2Ω+3%)

ΔT/R = Total Resistance Change; S.S. = Setting Stability (voltage ratio)

GF063PK**P Terminal Style, Top Adjust Knob****Recommended
PCB Layout****GF063P1K****P1 Terminal Style, Top Adjust Knob****Recommended
PCB Layout****GF063WK****W Terminal Style, Top Adjust Knob****Recommended
PCB Layout****GF063UK****U Terminal Style, Top Adjust Knob****Recommended
PCB Layout**

GF063SK**S Terminal Style, Side Adjust Knob****GF063S1K****S1 Terminal Style, Side Adjust Knob****GF063XK****X Terminal Style, Side Adjust Knob****GF063X1K****X1 Terminal Style, Side Adjust Knob**

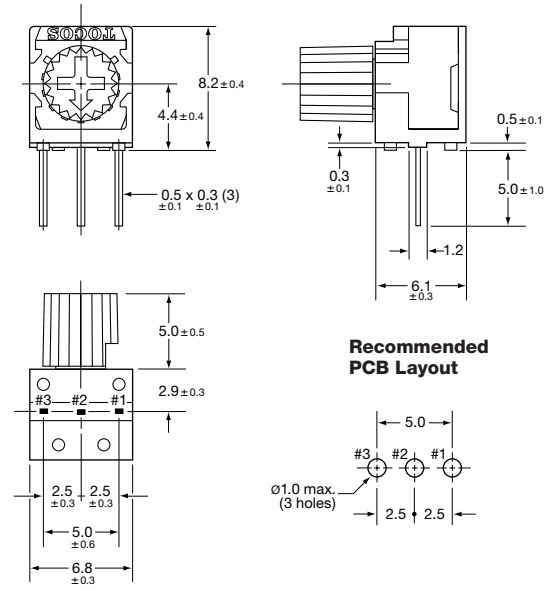
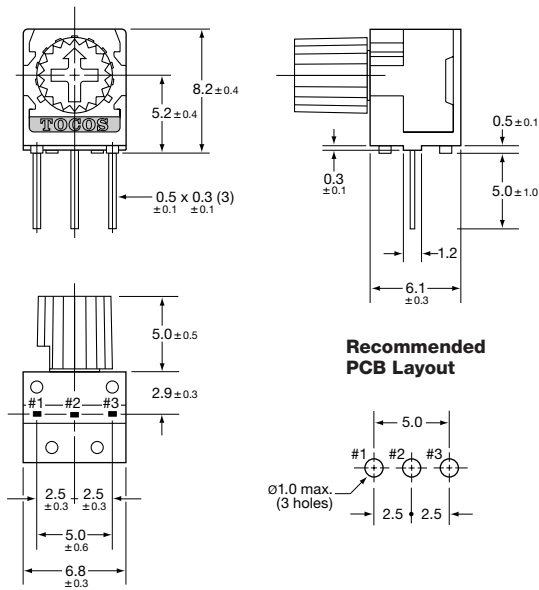
GF063VK

V Terminal Style, Side Adjust Knob

GF063V1K

V1 Terminal Style, Side Adjust Knob

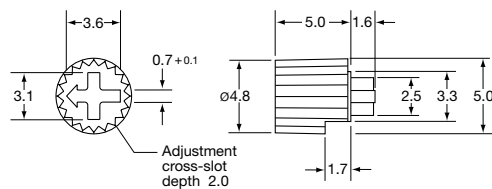
Unit: mm



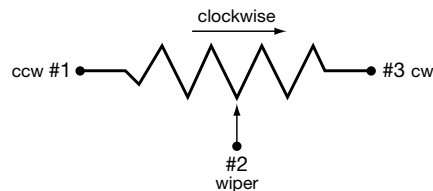
Knob Dimensions

All GF063-K Models

Unit: mm



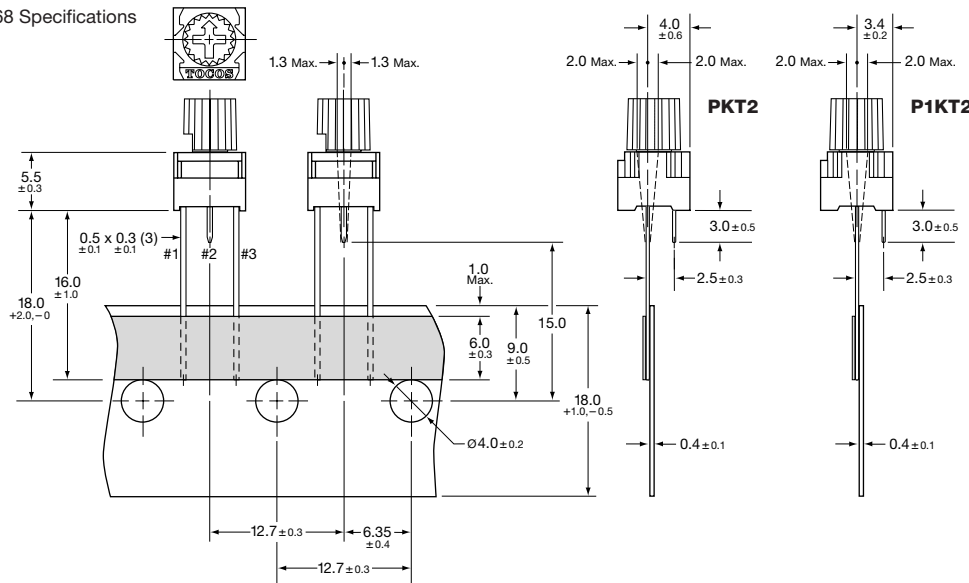
Electrical Schematic



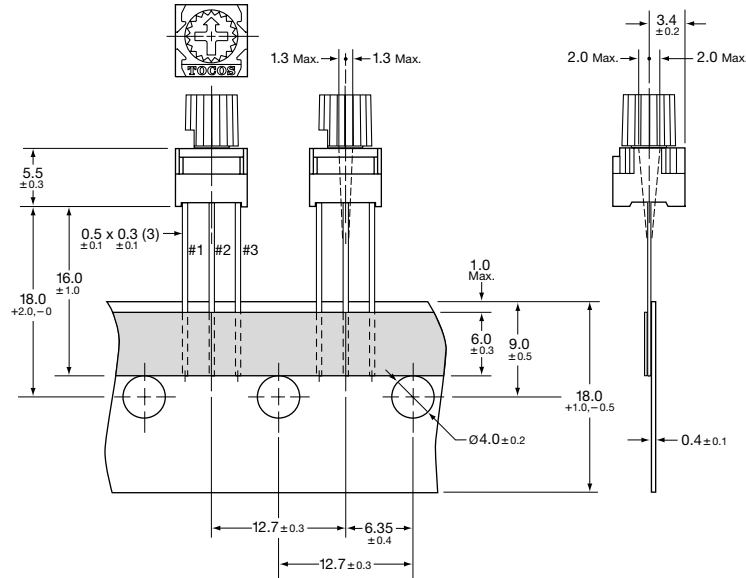
Tape Dimensions

Conforms to EIA-468 Specifications

PKT2, P1KT2



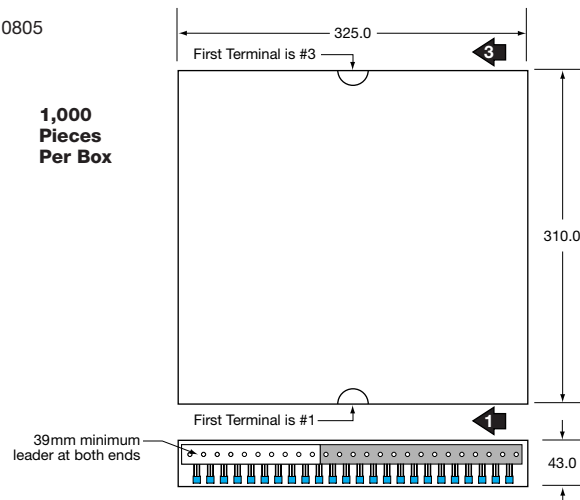
UKT2

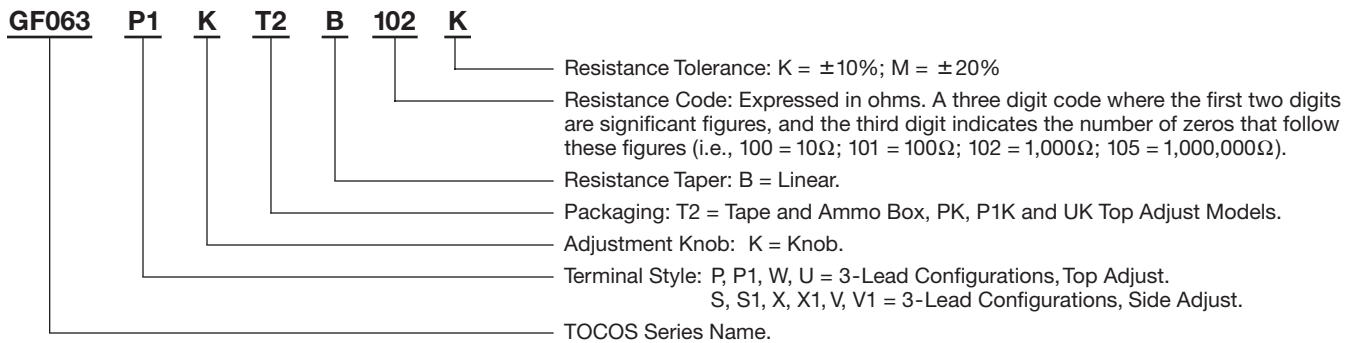


Ammo Box Dimensions

Conforms to EIA-468-B and JIS-C-0805

PKT2, P1KT2, UKT2





Part Numbers

Nominal Resistance		Resistance Tolerance $\pm 10\%$		Resistance Tolerance $\pm 20\%$		Potentiometer Styles
Value (Ω)	Code	Catalog No. Tape & Ammo Box	Catalog No. Bulk	Catalog No. Tape & Ammo Box	Catalog No. Bulk	

GF063PK Through-Hole, P Terminal Style, Top Adjust Knob

10	100	GF063PKT2 B 100 K	GF063PK B 100 K	GF063PKT2 B 100 M	GF063PK B 100 M
20	200	GF063PKT2 B 200 K	GF063PK B 200 K	GF063PKT2 B 200 M	GF063PK B 200 M
50	500	GF063PKT2 B 500 K	GF063PK B 500 K	GF063PKT2 B 500 M	GF063PK B 500 M
100	101	GF063PKT2 B 101 K	GF063PK B 101 K	GF063PKT2 B 101 M	GF063PK B 101 M
200	201	GF063PKT2 B 201 K	GF063PK B 201 K	GF063PKT2 B 201 M	GF063PK B 201 M
500	501	GF063PKT2 B 501 K	GF063PK B 501 K	GF063PKT2 B 501 M	GF063PK B 501 M
1,000	102	GF063PKT2 B 102 K	GF063PK B 102 K	GF063PKT2 B 102 M	GF063PK B 102 M
2,000	202	GF063PKT2 B 202 K	GF063PK B 202 K	GF063PKT2 B 202 M	GF063PK B 202 M
5,000	502	GF063PKT2 B 502 K	GF063PK B 502 K	GF063PKT2 B 502 M	GF063PK B 502 M
10,000	103	GF063PKT2 B 103 K	GF063PK B 103 K	GF063PKT2 B 103 M	GF063PK B 103 M
20,000	203	GF063PKT2 B 203 K	GF063PK B 203 K	GF063PKT2 B 203 M	GF063PK B 203 M
50,000	503	GF063PKT2 B 503 K	GF063PK B 503 K	GF063PKT2 B 503 M	GF063PK B 503 M
100,000	104	GF063PKT2 B 104 K	GF063PK B 104 K	GF063PKT2 B 104 M	GF063PK B 104 M
200,000	204	GF063PKT2 B 204 K	GF063PK B 204 K	GF063PKT2 B 204 M	GF063PK B 204 M
500,000	504	GF063PKT2 B 504 K	GF063PK B 504 K	GF063PKT2 B 504 M	GF063PK B 504 M
1,000,000	105	GF063PKT2 B 105 K	GF063PK B 105 K	GF063PKT2 B 105 M	GF063PK B 105 M
2,000,000	205	GF063PKT2 B 205 K	GF063PK B 205 K	GF063PKT2 B 205 M	GF063PK B 205 M
5,000,000	505	GF063PKT2 B 505 K	GF063PK B 505 K	GF063PKT2 B 505 M	GF063PK B 505 M



GF063PK

GF063P1K Through-Hole, P1 Terminal Style, Top Adjust Knob

10	100	GF063P1KT2 B 100 K	GF063P1K B 100 K	GF063P1KT2 B 100 M	GF063P1K B 100 M
20	200	GF063P1KT2 B 200 K	GF063P1K B 200 K	GF063P1KT2 B 200 M	GF063P1K B 200 M
50	500	GF063P1KT2 B 500 K	GF063P1K B 500 K	GF063P1KT2 B 500 M	GF063P1K B 500 M
100	101	GF063P1KT2 B 101 K	GF063P1K B 101 K	GF063P1KT2 B 101 M	GF063P1K B 101 M
200	201	GF063P1KT2 B 201 K	GF063P1K B 201 K	GF063P1KT2 B 201 M	GF063P1K B 201 M
500	501	GF063P1KT2 B 501 K	GF063P1K B 501 K	GF063P1KT2 B 501 M	GF063P1K B 501 M
1,000	102	GF063P1KT2 B 102 K	GF063P1K B 102 K	GF063P1KT2 B 102 M	GF063P1K B 102 M
2,000	202	GF063P1KT2 B 202 K	GF063P1K B 202 K	GF063P1KT2 B 202 M	GF063P1K B 202 M
5,000	502	GF063P1KT2 B 502 K	GF063P1K B 502 K	GF063P1KT2 B 502 M	GF063P1K B 502 M
10,000	103	GF063P1KT2 B 103 K	GF063P1K B 103 K	GF063P1KT2 B 103 M	GF063P1K B 103 M
20,000	203	GF063P1KT2 B 203 K	GF063P1K B 203 K	GF063P1KT2 B 203 M	GF063P1K B 203 M
50,000	503	GF063P1KT2 B 503 K	GF063P1K B 503 K	GF063P1KT2 B 503 M	GF063P1K B 503 M
100,000	104	GF063P1KT2 B 104 K	GF063P1K B 104 K	GF063P1KT2 B 104 M	GF063P1K B 104 M
200,000	204	GF063P1KT2 B 204 K	GF063P1K B 204 K	GF063P1KT2 B 204 M	GF063P1K B 204 M
500,000	504	GF063P1KT2 B 504 K	GF063P1K B 504 K	GF063P1KT2 B 504 M	GF063P1K B 504 M
1,000,000	105	GF063P1KT2 B 105 K	GF063P1K B 105 K	GF063P1KT2 B 105 M	GF063P1K B 105 M
2,000,000	205	GF063P1KT2 B 205 K	GF063P1K B 205 K	GF063P1KT2 B 205 M	GF063P1K B 205 M
5,000,000	505	GF063P1KT2 B 505 K	GF063P1K B 505 K	GF063P1KT2 B 505 M	GF063P1K B 505 M



GF063P1K

Nominal Resistance		Resistance Tolerance $\pm 10\%$		Resistance Tolerance $\pm 20\%$		Potentiometer Styles
Value (Ω)	Code	Catalog No. Tape & Ammo Box	Catalog No. Bulk	Catalog No. Tape & Ammo Box	Catalog No. Bulk	

GF063WK Through-Hole, W Terminal Style, Top Adjust Knob

10	100	—	GF063WK B 100 K	—	GF063WK B 100 M
20	200	—	GF063WK B 200 K	—	GF063WK B 200 M
50	500	—	GF063WK B 500 K	—	GF063WK B 500 M
100	101	—	GF063WK B 101 K	—	GF063WK B 101 M
200	201	—	GF063WK B 201 K	—	GF063WK B 201 M
500	501	—	GF063WK B 501 K	—	GF063WK B 501 M
1,000	102	—	GF063WK B 102 K	—	GF063WK B 102 M
2,000	202	—	GF063WK B 202 K	—	GF063WK B 202 M
5,000	502	—	GF063WK B 502 K	—	GF063WK B 502 M
10,000	103	—	GF063WK B 103 K	—	GF063WK B 103 M
20,000	203	—	GF063WK B 203 K	—	GF063WK B 203 M
50,000	503	—	GF063WK B 503 K	—	GF063WK B 503 M
100,000	104	—	GF063WK B 104 K	—	GF063WK B 104 M
200,000	204	—	GF063WK B 204 K	—	GF063WK B 204 M
500,000	504	—	GF063WK B 504 K	—	GF063WK B 504 M
1,000,000	105	—	GF063WK B 105 K	—	GF063WK B 105 M
2,000,000	205	—	GF063WK B 205 K	—	GF063WK B 205 M
5,000,000	505	—	GF063WK B 505 K	—	GF063WK B 505 M

**GF063WK****GF063UK Through-Hole, U Terminal Style, Top Adjust Knob**

10	100	GF063UKT2 B 100 K	GF063UK B 100 K	GF063UKT2 B 100 M	GF063UK B 100 M
20	200	GF063UKT2 B 200 K	GF063UK B 200 K	GF063UKT2 B 200 M	GF063UK B 200 M
50	500	GF063UKT2 B 500 K	GF063UK B 500 K	GF063UKT2 B 500 M	GF063UK B 500 M
100	101	GF063UKT2 B 101 K	GF063UK B 101 K	GF063UKT2 B 101 M	GF063UK B 101 M
200	201	GF063UKT2 B 201 K	GF063UK B 201 K	GF063UKT2 B 201 M	GF063UK B 201 M
500	501	GF063UKT2 B 501 K	GF063UK B 501 K	GF063UKT2 B 501 M	GF063UK B 501 M
1,000	102	GF063UKT2 B 102 K	GF063UK B 102 K	GF063UKT2 B 102 M	GF063UK B 102 M
2,000	202	GF063UKT2 B 202 K	GF063UK B 202 K	GF063UKT2 B 202 M	GF063UK B 202 M
5,000	502	GF063UKT2 B 502 K	GF063UK B 502 K	GF063UKT2 B 502 M	GF063UK B 502 M
10,000	103	GF063UKT2 B 103 K	GF063UK B 103 K	GF063UKT2 B 103 M	GF063UK B 103 M
20,000	203	GF063UKT2 B 203 K	GF063UK B 203 K	GF063UKT2 B 203 M	GF063UK B 203 M
50,000	503	GF063UKT2 B 503 K	GF063UK B 503 K	GF063UKT2 B 503 M	GF063UK B 503 M
100,000	104	GF063UKT2 B 104 K	GF063UK B 104 K	GF063UKT2 B 104 M	GF063UK B 104 M
200,000	204	GF063UKT2 B 204 K	GF063UK B 204 K	GF063UKT2 B 204 M	GF063UK B 204 M
500,000	504	GF063UKT2 B 504 K	GF063UK B 504 K	GF063UKT2 B 504 M	GF063UK B 504 M
1,000,000	105	GF063UKT2 B 105 K	GF063UK B 105 K	GF063UKT2 B 105 M	GF063UK B 105 M
2,000,000	205	GF063UKT2 B 205 K	GF063UK B 205 K	GF063UKT2 B 205 M	GF063UK B 205 M
5,000,000	505	GF063UKT2 B 505 K	GF063UK B 505 K	GF063UKT2 B 505 M	GF063UK B 505 M

**GF063UK****GF063SK Through-Hole, S Terminal Style, Side Adjust Knob**

10	100	—	GF063SK B 100 K	—	GF063SK B 100 M
20	200	—	GF063SK B 200 K	—	GF063SK B 200 M
50	500	—	GF063SK B 500 K	—	GF063SK B 500 M
100	101	—	GF063SK B 101 K	—	GF063SK B 101 M
200	201	—	GF063SK B 201 K	—	GF063SK B 201 M
500	501	—	GF063SK B 501 K	—	GF063SK B 501 M
1,000	102	—	GF063SK B 102 K	—	GF063SK B 102 M
2,000	202	—	GF063SK B 202 K	—	GF063SK B 202 M
5,000	502	—	GF063SK B 502 K	—	GF063SK B 502 M
10,000	103	—	GF063SK B 103 K	—	GF063SK B 103 M
20,000	203	—	GF063SK B 203 K	—	GF063SK B 203 M
50,000	503	—	GF063SK B 503 K	—	GF063SK B 503 M
100,000	104	—	GF063SK B 104 K	—	GF063SK B 104 M
200,000	204	—	GF063SK B 204 K	—	GF063SK B 204 M
500,000	504	—	GF063SK B 504 K	—	GF063SK B 504 M
1,000,000	105	—	GF063SK B 105 K	—	GF063SK B 105 M
2,000,000	205	—	GF063SK B 205 K	—	GF063SK B 205 M
5,000,000	505	—	GF063SK B 505 K	—	GF063SK B 505 M

**GF063SK**

Nominal Resistance		Resistance Tolerance $\pm 10\%$		Resistance Tolerance $\pm 20\%$		Potentiometer Styles
Value (Ω)	Code	Catalog No. Tape & Ammo Box	Catalog No. Bulk	Catalog No. Tape & Ammo Box	Catalog No. Bulk	

GF063S1K Through-Hole, S1 Terminal Style, Side Adjust Knob

10	100	—	GF063S1K B 100 K	—	GF063S1K B 100 M
20	200	—	GF063S1K B 200 K	—	GF063S1K B 200 M
50	500	—	GF063S1K B 500 K	—	GF063S1K B 500 M
100	101	—	GF063S1K B 101 K	—	GF063S1K B 101 M
200	201	—	GF063S1K B 201 K	—	GF063S1K B 201 M
500	501	—	GF063S1K B 501 K	—	GF063S1K B 501 M
1,000	102	—	GF063S1K B 102 K	—	GF063S1K B 102 M
2,000	202	—	GF063S1K B 202 K	—	GF063S1K B 202 M
5,000	502	—	GF063S1K B 502 K	—	GF063S1K B 502 M
10,000	103	—	GF063S1K B 103 K	—	GF063S1K B 103 M
20,000	203	—	GF063S1K B 203 K	—	GF063S1K B 203 M
50,000	503	—	GF063S1K B 503 K	—	GF063S1K B 503 M
100,000	104	—	GF063S1K B 104 K	—	GF063S1K B 104 M
200,000	204	—	GF063S1K B 204 K	—	GF063S1K B 204 M
500,000	504	—	GF063S1K B 504 K	—	GF063S1K B 504 M
1,000,000	105	—	GF063S1K B 105 K	—	GF063S1K B 105 M
2,000,000	205	—	GF063S1K B 205 K	—	GF063S1K B 205 M
5,000,000	505	—	GF063S1K B 505 K	—	GF063S1K B 505 M

**GF063XK Through-Hole, X Terminal Style, Side Adjust Knob**

10	100	—	GF063XK B 100 K	—	GF063XK B 100 M
20	200	—	GF063XK B 200 K	—	GF063XK B 200 M
50	500	—	GF063XK B 500 K	—	GF063XK B 500 M
100	101	—	GF063XK B 101 K	—	GF063XK B 101 M
200	201	—	GF063XK B 201 K	—	GF063XK B 201 M
500	501	—	GF063XK B 501 K	—	GF063XK B 501 M
1,000	102	—	GF063XK B 102 K	—	GF063XK B 102 M
2,000	202	—	GF063XK B 202 K	—	GF063XK B 202 M
5,000	502	—	GF063XK B 502 K	—	GF063XK B 502 M
10,000	103	—	GF063XK B 103 K	—	GF063XK B 103 M
20,000	203	—	GF063XK B 203 K	—	GF063XK B 203 M
50,000	503	—	GF063XK B 503 K	—	GF063XK B 503 M
100,000	104	—	GF063XK B 104 K	—	GF063XK B 104 M
200,000	204	—	GF063XK B 204 K	—	GF063XK B 204 M
500,000	504	—	GF063XK B 504 K	—	GF063XK B 504 M
1,000,000	105	—	GF063XK B 105 K	—	GF063XK B 105 M
2,000,000	205	—	GF063XK B 205 K	—	GF063XK B 205 M
5,000,000	505	—	GF063XK B 505 K	—	GF063XK B 505 M

**GF063X1K Through-Hole, X1 Terminal Style, Side Adjust Knob**

10	100	—	GF063X1K B 100 K	—	GF063X1K B 100 M
20	200	—	GF063X1K B 200 K	—	GF063X1K B 200 M
50	500	—	GF063X1K B 500 K	—	GF063X1K B 500 M
100	101	—	GF063X1K B 101 K	—	GF063X1K B 101 M
200	201	—	GF063X1K B 201 K	—	GF063X1K B 201 M
500	501	—	GF063X1K B 501 K	—	GF063X1K B 501 M
1,000	102	—	GF063X1K B 102 K	—	GF063X1K B 102 M
2,000	202	—	GF063X1K B 202 K	—	GF063X1K B 202 M
5,000	502	—	GF063X1K B 502 K	—	GF063X1K B 502 M
10,000	103	—	GF063X1K B 103 K	—	GF063X1K B 103 M
20,000	203	—	GF063X1K B 203 K	—	GF063X1K B 203 M
50,000	503	—	GF063X1K B 503 K	—	GF063X1K B 503 M
100,000	104	—	GF063X1K B 104 K	—	GF063X1K B 104 M
200,000	204	—	GF063X1K B 204 K	—	GF063X1K B 204 M
500,000	504	—	GF063X1K B 504 K	—	GF063X1K B 504 M
1,000,000	105	—	GF063X1K B 105 K	—	GF063X1K B 105 M
2,000,000	205	—	GF063X1K B 205 K	—	GF063X1K B 205 M
5,000,000	505	—	GF063X1K B 505 K	—	GF063X1K B 505 M



Nominal Resistance		Resistance Tolerance $\pm 10\%$		Resistance Tolerance $\pm 20\%$		Potentiometer Styles
Value (Ω)	Code	Catalog No. Tape & Ammo Box	Catalog No. Bulk	Catalog No. Tape & Ammo Box	Catalog No. Bulk	

GF063VK Through-Hole, V Terminal Style, Side Adjust Knob

10	100	—	GF063VK B 100 K	—	GF063VK B 100 M	
20	200	—	GF063VK B 200 K	—	GF063VK B 200 M	
50	500	—	GF063VK B 500 K	—	GF063VK B 500 M	
100	101	—	GF063VK B 101 K	—	GF063VK B 101 M	
200	201	—	GF063VK B 201 K	—	GF063VK B 201 M	
500	501	—	GF063VK B 501 K	—	GF063VK B 501 M	
1,000	102	—	GF063VK B 102 K	—	GF063VK B 102 M	
2,000	202	—	GF063VK B 202 K	—	GF063VK B 202 M	
5,000	502	—	GF063VK B 502 K	—	GF063VK B 502 M	
10,000	103	—	GF063VK B 103 K	—	GF063VK B 103 M	
20,000	203	—	GF063VK B 203 K	—	GF063VK B 203 M	
50,000	503	—	GF063VK B 503 K	—	GF063VK B 503 M	
100,000	104	—	GF063VK B 104 K	—	GF063VK B 104 M	
200,000	204	—	GF063VK B 204 K	—	GF063VK B 204 M	
500,000	504	—	GF063VK B 504 K	—	GF063VK B 504 M	
1,000,000	105	—	GF063VK B 105 K	—	GF063VK B 105 M	
2,000,000	205	—	GF063VK B 205 K	—	GF063VK B 205 M	
5,000,000	505	—	GF063VK B 505 K	—	GF063VK B 505 M	

GF063VK

GF063V1K Through-Hole, V1 Terminal Style, Side Adjust Knob

10	100	—	GF063V1K B 100 K	—	GF063V1K B 100 M	
20	200	—	GF063V1K B 200 K	—	GF063V1K B 200 M	
50	500	—	GF063V1K B 500 K	—	GF063V1K B 500 M	
100	101	—	GF063V1K B 101 K	—	GF063V1K B 101 M	
200	201	—	GF063V1K B 201 K	—	GF063V1K B 201 M	
500	501	—	GF063V1K B 501 K	—	GF063V1K B 501 M	
1,000	102	—	GF063V1K B 102 K	—	GF063V1K B 102 M	
2,000	202	—	GF063V1K B 202 K	—	GF063V1K B 202 M	
5,000	502	—	GF063V1K B 502 K	—	GF063V1K B 502 M	
10,000	103	—	GF063V1K B 103 K	—	GF063V1K B 103 M	
20,000	203	—	GF063V1K B 203 K	—	GF063V1K B 203 M	
50,000	503	—	GF063V1K B 503 K	—	GF063V1K B 503 M	
100,000	104	—	GF063V1K B 104 K	—	GF063V1K B 104 M	
200,000	204	—	GF063V1K B 204 K	—	GF063V1K B 204 M	
500,000	504	—	GF063V1K B 504 K	—	GF063V1K B 504 M	
1,000,000	105	—	GF063V1K B 105 K	—	GF063V1K B 105 M	
2,000,000	205	—	GF063V1K B 205 K	—	GF063V1K B 205 M	
5,000,000	505	—	GF063V1K B 505 K	—	GF063V1K B 505 M	

GF063V1K

Packaging**Standard:****Tape & Ammo Packaging**

PKT2, P1KT2 & UT2

1,000 pieces per ammo box.

Bulk Packaging

All GF063-K Models

50 pieces per vinyl bag.

500 pieces per box.

Soldering and Cleaning Guidelines

For soldering, cleaning and other information, refer to Guidelines and Precautions for Using Potentiometers.