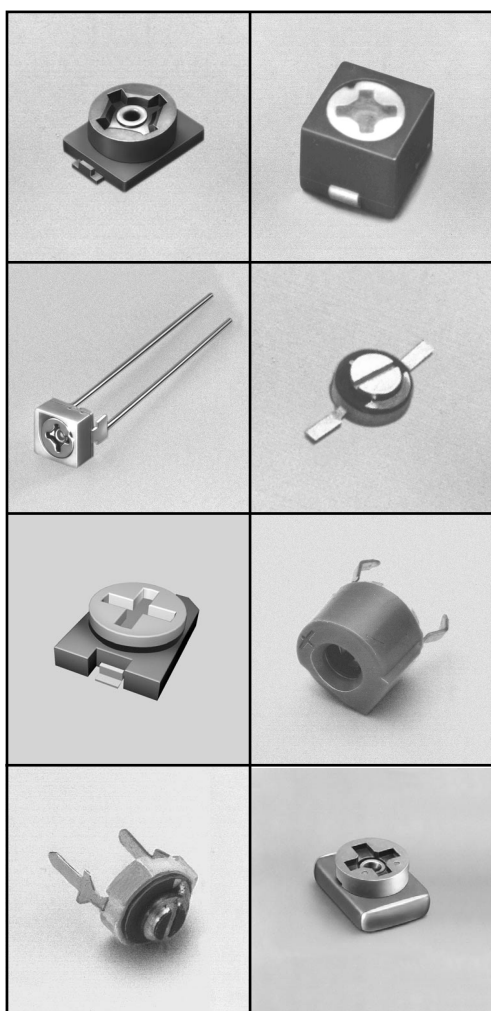


CERAMIC DIELECTRIC TRIMMER CAPACITORS



Engineering Bulletin SG-305 Contents

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- Specification Notes
- Application Notes



Sprague-Goodman Electronics, Inc.

1700 SHAMES DRIVE, WESTBURY, NY 11590

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E-MAIL: info@spraguegoodman.com

SURFTRIM® SURFACE MOUNT GKP SERIES

FEATURES

- Multilayer construction.
- Setting drift within 0.5%
- Low mounting profile.
- Carrier and reel packaging standard.
- NPO temperature coefficient (up to 10 pF max).
- Self resonant frequency above 1 GHz.

2.2 x 3.1 x 1.2 mm Models



Capacitance (pF)		TCC (ppm/°C)	Q min (1 MHz)	Carrier and Reel Pack Model No.
min	max			
1.5	3.0	0 ± 500	200	GKP3R066
2.5	6.0	0 ± 500	200	GKP6R066
3.0	10.0	0 ± 500	200	GKP10066
4.5	20.0	N750 ± 500	200	GKP20066

Carrier and reel specifications on page 11.

SPECIFICATIONS

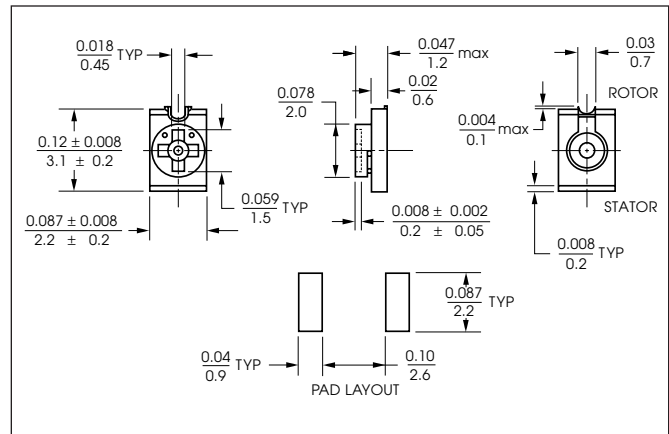
Operating Temperature Range: -25°C to +85°C

Voltage Rating: 50 VDC

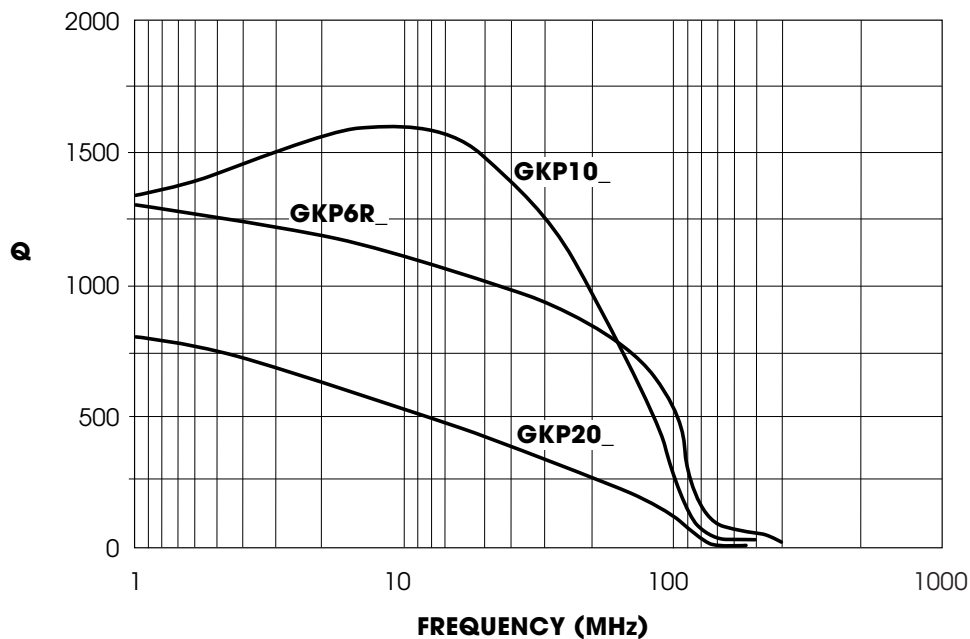
Dielectric Withstanding Voltage: 110 VDC

Insulation Resistance: 10⁴ Megohms min

Torque: 10 to 100 g-cm (0.14 to 1.39 oz-in)



All dimensions are in /mm.
Unless otherwise specified, the tolerance on dimensions is ± 0.004/0.1.



SURFTRIM® SURFACE MOUNT GKY SERIES

FEATURES

- Designed for reflow soldering.
- Available in carrier and reel packaging.
- Sealed version available - contact factory for details

3.2 x 4.5 x 1.8 mm Models



SPECIFICATIONS

Operating

Temperature Range: -25°C to +85°C

Voltage Rating: 100 VDC

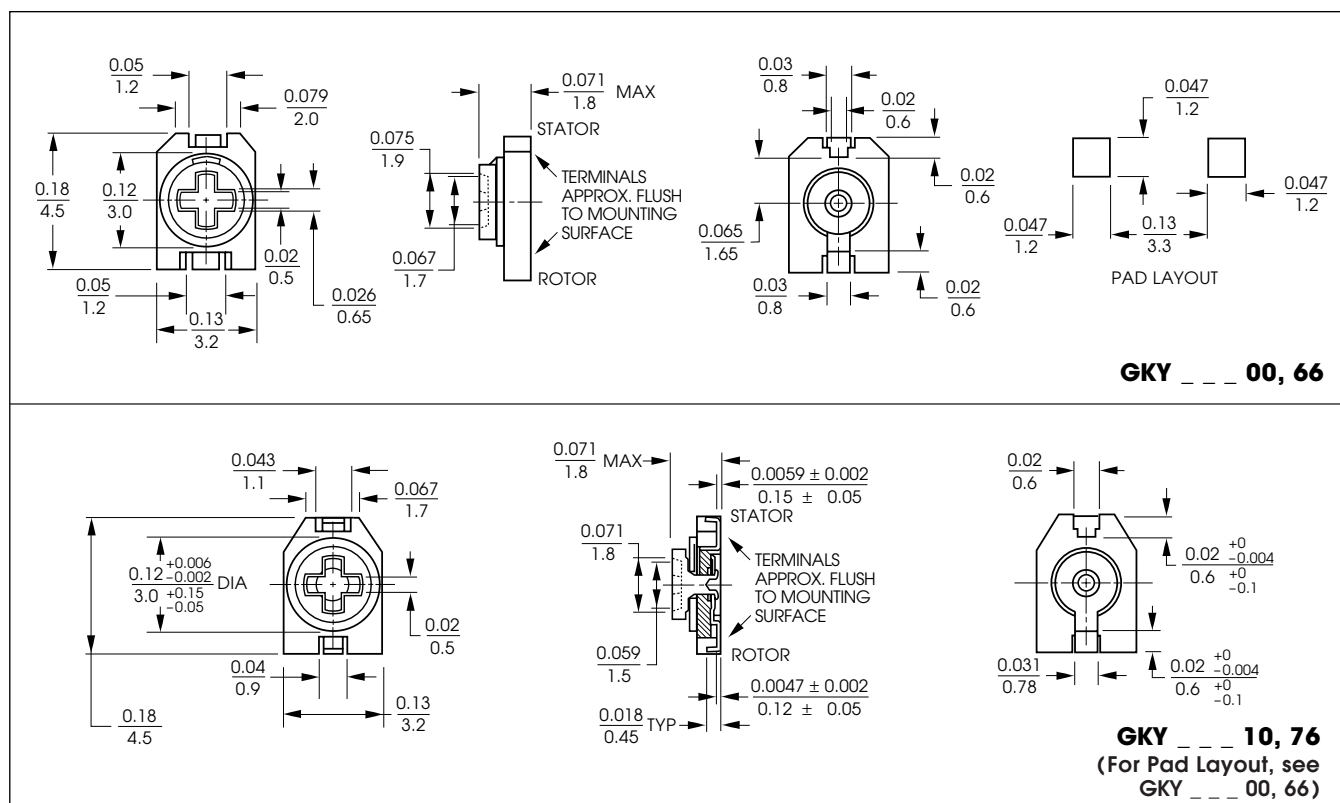
Dielectric Withstanding Voltage: 220 VDC

Insulation Resistance: 10⁴ Megohms min

Torque: 10 to 150 g-cm (0.14 to 2.08 oz-in)

Capacitance (pF)		TCC (ppm/°C)	Q min (1 MHz)	Color Code	Bulk Pack Model No.	Carrier and Reel Pack Model No.
min	max					
1.0	3.0	0 ± 500	300	White	GKY3R010	GKY3R076
1.7	3.0	0 ± 300	500	Brown	GKY3R000	GKY3R066
2.5	6.0	0 ± 300	500	Blue	GKY6R000	GKY6R066
3.0	10.0	N400 ± 400	500	White	GKY10000	GKY10066
5.0	20.0	N900 ± 400	300	Red	GKY20000	GKY20066
6.0	30.0	N1200 ± 500	300	Green	GKY30000	GKY30066
5.0	40.0	N750 ± 500	300	White	GKY40010	GKY40076
7.0	50.0	N750 ± 500	300	White	GKY50010	GKY50076

Carrier and reel specifications on page 11.



All dimensions are in / mm.

Unless otherwise specified, the tolerance on dimensions is ± 0.004 / 0.1.

SURFTRIM® SURFACE MOUNT Sealed Construction

FEATURES

- Process seal provides protection against contaminants (flux, solvents, etc.) during production.
- Designed for flow and reflow soldering.
- Available in carrier and reel packaging.

SPECIFICATIONS

Operating Temperature Range: -25°C to +85°C
(For expanded temperature range applications, consult factory.)

Voltage Rating: 100 VDC

Dielectric Withstanding Voltage: 220 VDC

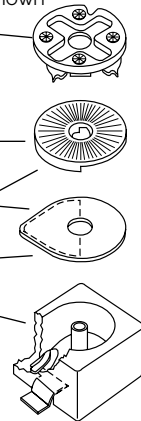
Insulation Resistance: 10⁴ Megohms min

Torque: 15 to 100 g-cm (0.2 to 1.39 oz-in)

CONSTRUCTION DETAILS OF 4 x 4.5 mm GKG MODELS

Model GKG ___ 27 Shown

- Special "drive assembly" with pointed spring fingers to engage rotor upper surface contour. Spring fingers also provide proper tension for smooth torque and low resistance.
- Special rotor with die-formed "drive" contour on upper surface.
- Flat-lapped and lubricated surfaces join for reliable capacitance settings.
- Special ceramic stator insert with metalized electrode.
- Solid one-piece housing with integrally molded terminals and contact areas. Central tubular column is spun-out into a flare after assembly to maintain built-in spring tension.



4 x 4.5 x 2.7 mm Models

Capacitance (pF)		TCC (ppm/°C)	Q min (1 MHz)	Color Code	Bulk Pack Model No.	Carrier and Reel Pack Model No.	Bulk Pack Model No.	Carrier and Reel Pack Model No.	Bulk Pack Model No.	Carrier and Reel Pack Model No.
*min	max									
1.4	3.0	0 ± 200	300**	†Red Dot	GKG3R026	GKG3R066	GKG3R027	GKG3R067	GKG3R028	GKG3R068
2.0	6.0	0 ± 200	500**	Blue	GKG6R026	GKG6R066	GKG6R027	GKG6R067	GKG6R028	GKG6R068
3.0	10.0	0 ± 300	500**	White	GKG10026	GKG10066	GKG10027	GKG10067	GKG10028	GKG10068
4.5	20.0	N900 ± 300	500**	Red	GKG20026	GKG20066	GKG20027	GKG20067	GKG20028	GKG20068
6.5	30.0	N1100 ± 450	300	Green	GKG30026	GKG30066	GKG30027	GKG30067	GKG30028	GKG30068
15.0	50.0	N1700 ± 500	300	Orange	GKG50H26	GKG50H66	GKG50H27	GKG50H67	GKG50H28	GKG50H68

† Marking on bottom of capacitor.

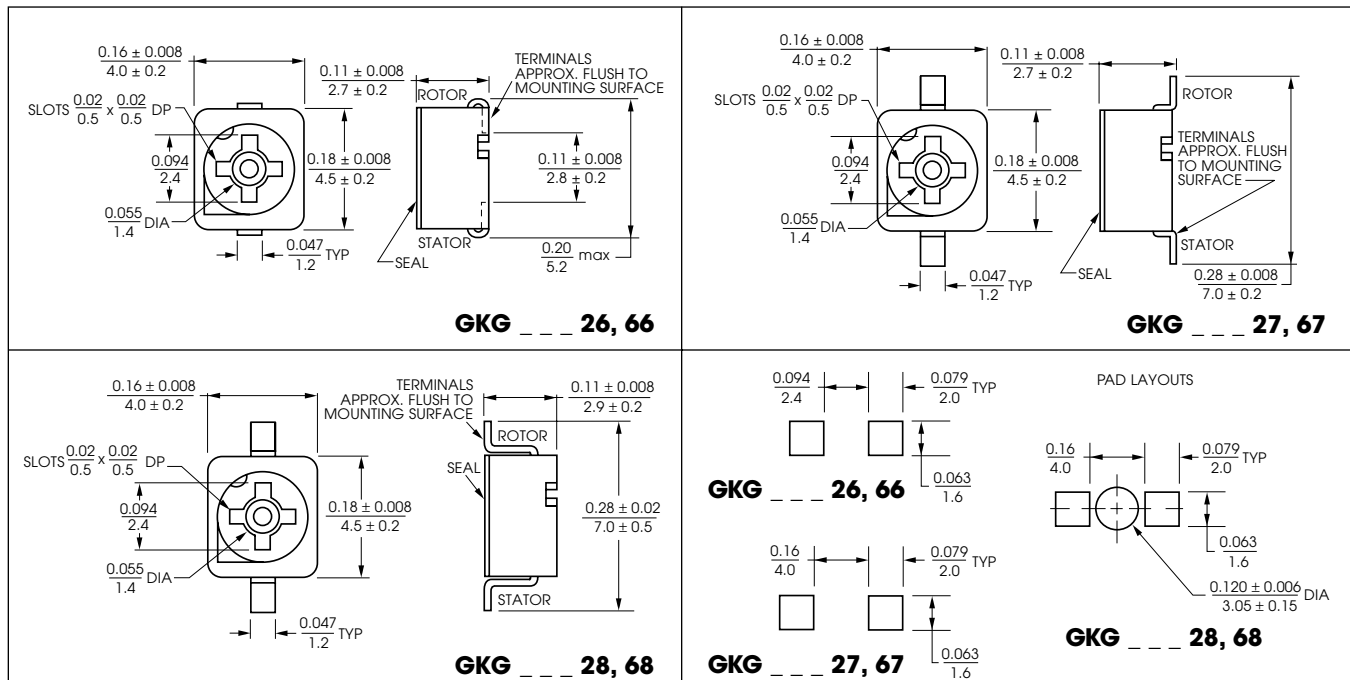
* Re-rated in 1994 for lower min capacitance.

** Q at 10MHz

Available without seal — consult factory.

Carrier and reel specifications on page 11.

Add -07 to Model No. for 700 / reel, -25 for 2500 / reel.



All dimensions are in /mm.

Unless otherwise specified, the tolerance on dimensions is ± 0.004 / 0.1.

PLASTIC ENCASED TYPE: 4 x 4.5 mm

Available With or Without Adjust Cavity Seal

FEATURES

- Very low cost due to automated production and solderless touch contact construction.
- Wide selection of capacitance ranges.
- Color coded housings.
- Easy blind tuning (2 slots at 90° angle in adjust cavity — accepts cross-slotted tool).
- Process seal on adjust screw access face (optional) provides protection against contaminants (flux, solvents, etc.) during production.

SPECIFICATIONS

Operating Temperature Range: -25°C to +85°C

Voltage Rating: 100 VDC

Dielectric Withstanding Voltage: 220 VDC

Insulation Resistance: 10⁴ Megohms min

Torque: 10 to 100 g-cm (0.14 to 1.39 oz-in)

4 x 4.5 mm Models

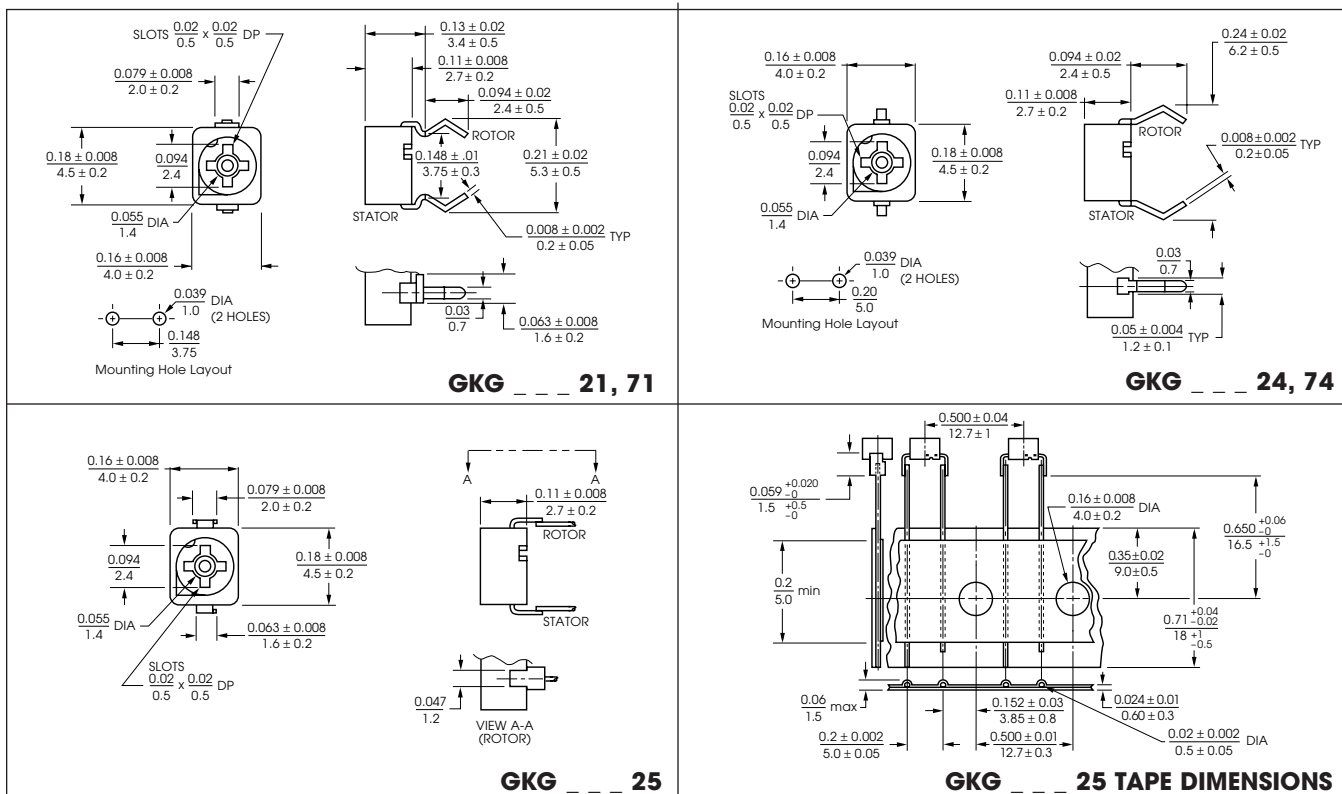
Capacitance (pF)		TCC (ppm/°C)	Q min		Color Code	Top Mount ³ Spring Lead Model No.		Top Mount ³ Spring Lead Model No.		Top Mount ⁴ Ammo Pack Model No.
¹ min	max		1 MHz	10 MHz		Unsealed	Sealed	Unsealed	Sealed	
1.4	3.0	0 ± 200	300	300	² Red Dot	GKG3R021	GKG3R071	GKG3R024	GKG3R074	GKG3R025
2.0	6.0	0 ± 200	500	300	Blue	GKG6R021	GKG6R071	GKG6R024	GKG6R074	GKG6R025
3.0	10.0	0 ± 300	500	300	White	GKG10021	GKG10071	GKG10024	GKG10074	GKG10025
4.5	20.0	N900 ± 350	500	300	Red	GKG20021	GKG20071	GKG20024	GKG20074	GKG20025
6.5	30.0	N1100 ± 450	300	300	Green	GKG30021	GKG30071	GKG30024	GKG30074	GKG30025
15.0	50.0	N1700 ± 500	300	N.A.	Orange	GKG50021	GKG50071	GKG50024	GKG50074	GKG50025

¹Re-rated in 1993.

²Marking on bottom of capacitor.

³Magazine pack (120 pieces) for auto insertion available — consult factory for pricing.

⁴Ammo pack contains 1000 pcs.



All dimensions are in /mm.

Unless otherwise specified, the tolerance on dimensions is ± 0.004/0.1.

Tape dimensions on page 3.

PLASTIC ENCASED TYPE: 6 mm

Available With or Without Membrane Adjust Cavity Seal

FEATURES

- Low cost due to automated production and solderless touch contact construction.
- Wide selection of capacitance ranges.
- Color coded housings.
- Double plastic housing provides improved protection against dust & contamination.
- Rugged construction (working parts supported by metal structure, not just plastic).
- Easy blind tuning (2 slots at 90° angle in adjust cavity — accepts cross-slotted tool).
- Visual indication of maximum capacitance setting.
- Membrane seal on adjust screw access face (optional) provides protection against contaminants (flux, solvents, etc.) during production.

SPECIFICATIONS

Operating Temperature Range: -25°C to +85°C

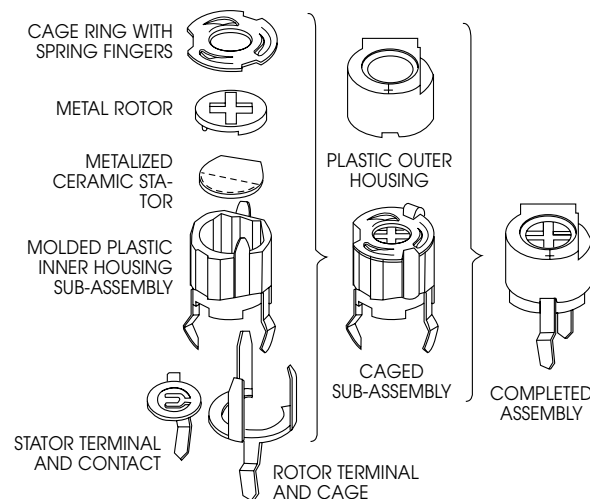
Voltage Rating: 100 VDC

Dielectric Withstanding Voltage: 220 VDC

Insulation Resistance: 10⁴ Megohms min

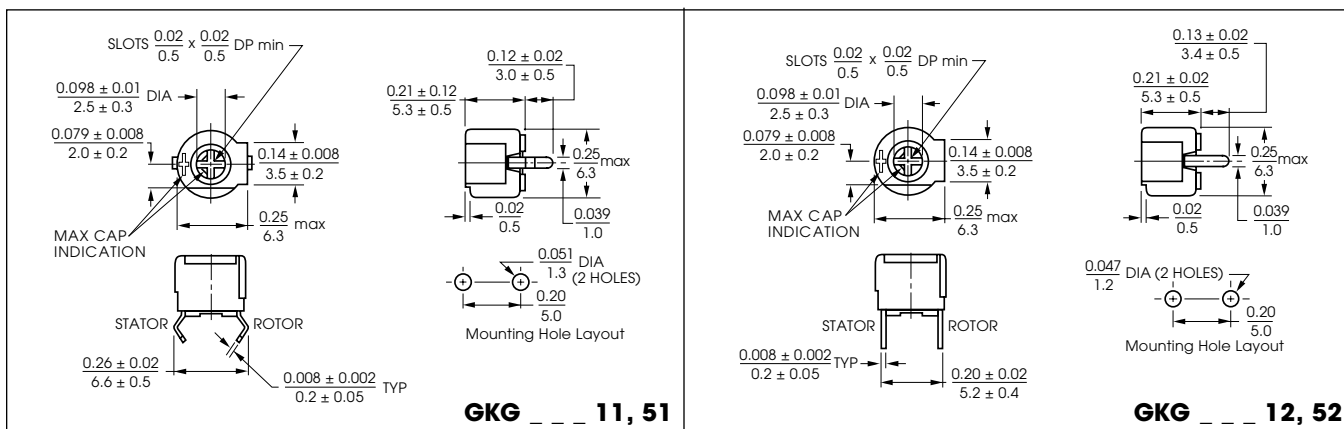
Torque: 20 to 200 g-cm (0.28 to 2.77 oz-in)

CONSTRUCTION DETAILS OF 6 mm GKG MODELS



6 mm Models

Capacitance (pF)		TCC (ppm/°C)	Q min (10 MHz)	Color Code	Top Mount Spring Lead Model No.		Top Mount Straight Lead Model No.	
min	max				Unsealed	Sealed	Unsealed	Sealed
2.8	10.0	0 ± 250	300	White	GKG10011	GKG10051	GKG10012	GKG10052
4.0	20.0	N600 ± 300	300	Red	GKG20011	GKG20051	GKG20012	GKG20052
5.5	30.0	N750 ± 300	200	Green	GKG30011	GKG30051	GKG30012	GKG30052
6.5	40.0	N750 ± 400	200	Yellow	GKG40011	GKG40051	GKG40012	GKG40052
8.0	50.0	N1200 ± 600	200	Orange	GKG50011	GKG50051	GKG50012	GKG50052
10.5	60.0	N1200 ± 600	200 (1 MHz)	Brown	GKG60011	GKG60051	GKG60012	GKG60052
12.0	70.0	N1500 ± 600	200 (1 MHz)	Grey	GKG70011	GKG70051	GKG70012	GKG70052
20.0	90.0	N2200 ± 600	200 (1 MHz)	Black	GKG90011	GKG90051	GKG90012	GKG90052



All dimensions are in / mm.

Unless otherwise specified, the tolerance on dimensions is ± 0.004 / 0.1; except slot tolerance is ± 0.008 / 0.2.

PLASTIC ENCASED TYPE: 6 mm ECONOMY

GKG SERIES

FEATURES

- Very low cost.
- Wide selection of capacitance ranges.
- Suitable for printed circuit production methods using "spring leads" or "straight leads".

SPECIFICATIONS

Operating Temperature Range: -25°C to +85°C

Voltage Rating: 100 VDC

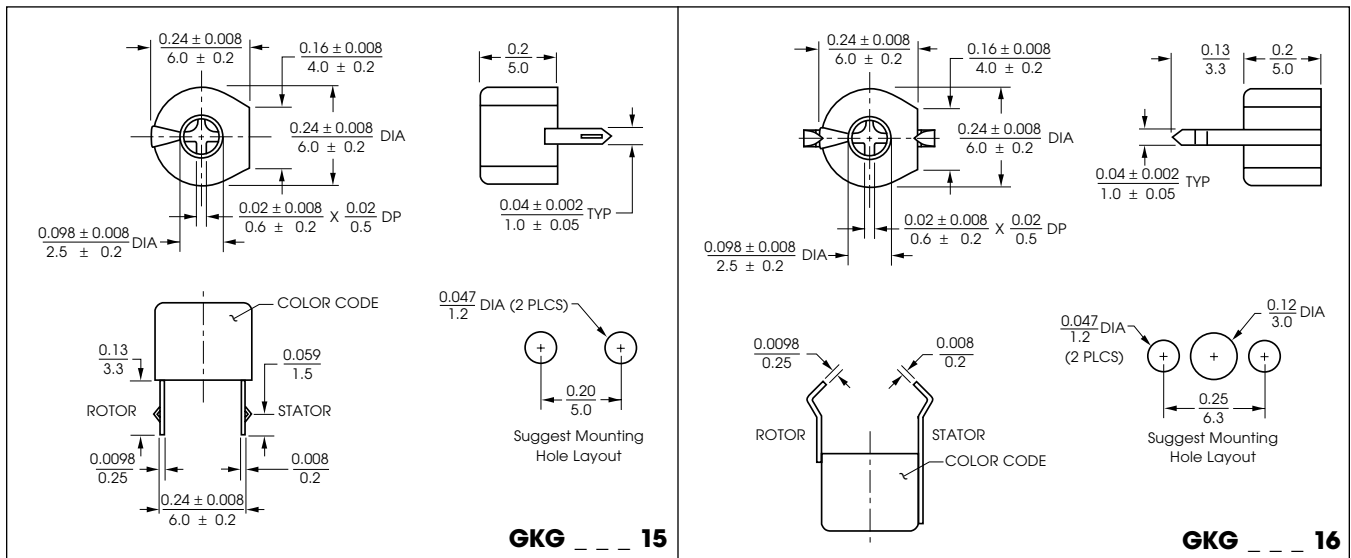
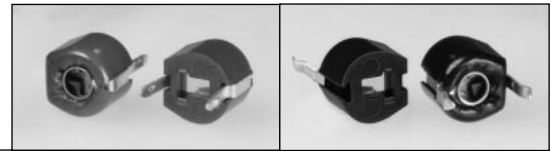
Dielectric Withstanding Voltage: 220 VDC

Insulation Resistance: 10^4 Megohms min

Torque: 15 to 150 g-cm (0.21 to 2.1 oz-in)

6 mm Economy Models

Capacitance (pF)		TCC (ppm/°C)	Q min (1 MHz)	Color Code	Top Adjust Model No.	Bottom Adjust Model No.
min	max					
1.0	3.0	NPO ± 250	300	Black	GKG3R015	GKG3R016
2.0	5.0	NPO ± 250	300	Blue	GKG5R015	GKG5R016
3.0	10.0	NPO ± 250	300	White	GKG10015	GKG10016
5.0	20.0	N750 ± 250	300	Red	GKG20015	GKG20016
6.5	30.0	N1000 ± 500	200	Green	GKG30015	GKG30016
7.0	40.0	N2200 ± 800	200	Yellow	GKG40015	GKG40016
10.0	50.0	N2200 ± 800	200	Brown	GKG50015	GKG50016
12.0	60.0	N2200 ± 800	200	Brown	GKG60015	GKG60016
15.0	70.0	N2200 ± 800	200	Brown	GKG70015	GKG70016



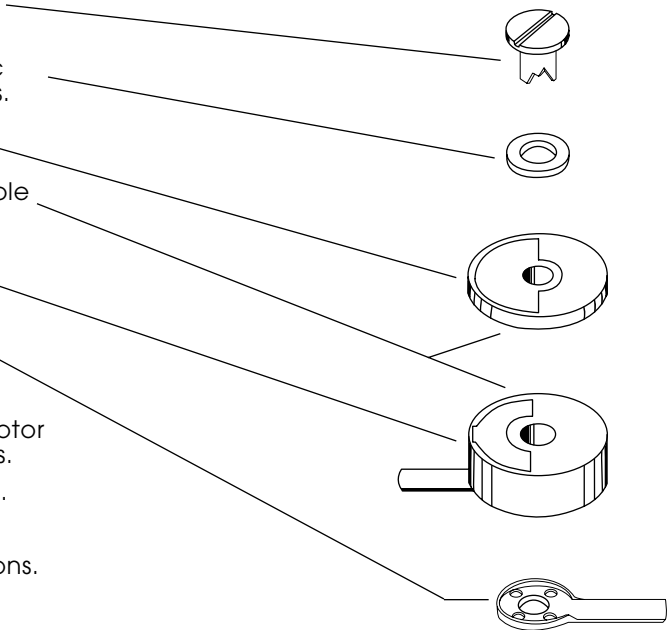
All dimensions are in / mm.

Unless otherwise specified, the tolerance on dimensions is $\pm 0.004/0.1$; except slot tolerance is $\pm 0.008/0.2$.

RUGGED 5 mm GKU SERIES

FEATURES

- Proven rugged axle design prevents electrode shifting, maximizes stability.
- Plastic washer between adjust shaft and ceramic rotor to absorb tuning and environmental stresses.
- Special ceramic dielectric rotor with metalized electrode.
- Flat-lapped and lubricated surfaces join for reliable capacity settings.
- Solid one-piece stator electrode and terminal, recessed and integral with base. Cannot shift. Improves stability and resistance to humidity.
- Combination spring/contact/terminal maintains proper tension for smooth torque and low resistance.
- Soldered connection between adjust shaft and rotor electrode eliminates contact resistance problems.
- Compact form factor conserves mounting space.
- Straight line capacitance curve.
- Low cost for industrial and commercial applications.



SPECIFICATIONS

Operating Temperature Range: -55°C to +125°C

Voltage Rating: 250 VDC at 85°C
125 VDC at 125°C

Dielectric

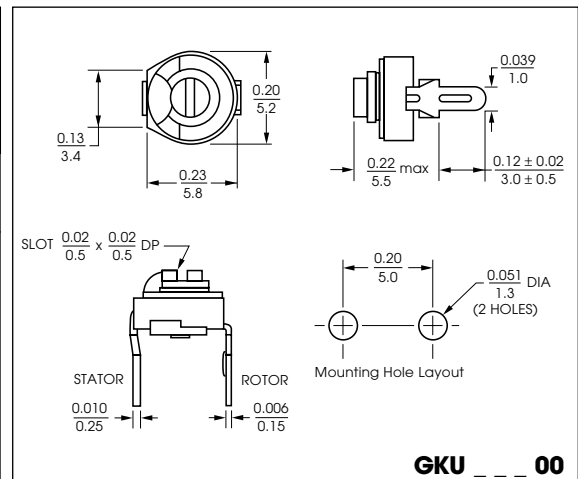
Withstanding Voltage: 500 VDC at 85°C
250 VDC at 125°C

Insulation Resistance: 10⁴ Megohms min

Torque: 30 to 140 g-cm (0.42 to 1.94 oz-in)

5 mm Rugged Models

Capacitance Range (pF)		TCC (ppm/°C)	Q min (10 MHz)	Color Code or Mark	Model No.
min	max				
1.5	† 5.5	0 ± 250	300	Black	GKU4R000
2.0	† 8.0	N100 ± 200	300	Red	GKU6R000
2.8	† 12.0	N600 ± 300	300	None	GKU10000
3.3	†† 20.5	N800 ± 300	300	Blue	GKU18000
3.8	† 28.5	N1350 ± 650	200	Purple	GKU25000
4.5	30.0	N1350 ± 650	200	Orange	GKU30000
5.0	40.0	N1600 ± 800	200	Brown	GKU40000
6.0	50.0	N1300 ± 500	150 (1MHz)	Green	GKU50000
7.0	60.0	N1300 ± 500	150 (1MHz)	Pink	GKU60000
15.0	90.0	N1500 ± 800	100 (1MHz)	None	GKU90000



† Re-rated in 1992 †† Re-rated in 1986

All dimensions are in /mm. Unless otherwise specified, the tolerance on dimensions is ± 0.004/0.1.

ECONOMY 5 mm GKU SERIES

FEATURES

- Economical for consumer and industrial applications.
- Rotor soldered to tuning axle for stability.
- For lead-through-hole connection to printed circuit boards.

SPECIFICATIONS

Operating Temperature Range: -25°C to $+85^{\circ}\text{C}$

Voltage Rating: 250 VDC

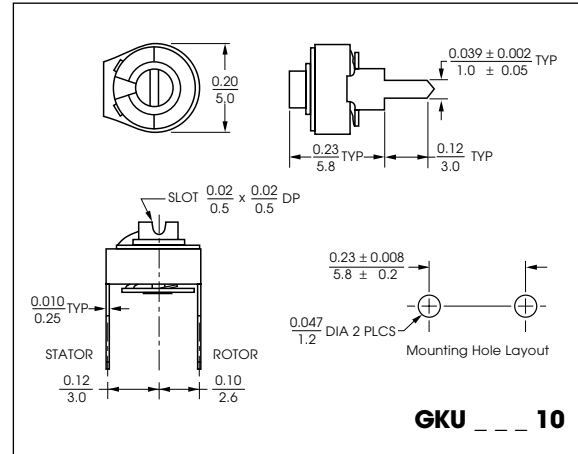
Dielectric Withstanding Voltages: 500 VDC

Insulation Resistance: 10^4 Megohms min

Torque: 35 to 200 g-cm (0.49 to 2.8 oz-in)

5 mm Economy Models

Capacitance Range (pF)		TCC (ppm/ $^{\circ}\text{C}$)	Q min (1 MHz)	Model No.
min	max			
1.0	3.0	0 ± 250	300	GKU3R010
2.0	6.0	0 ± 250	300	GKU6R010
3.0	10.0	$N750 \pm 250$	300	GKU10010
4.8	20.0	$N750 \pm 250$	300	GKU20010
5.5	30.0	$N1000 \pm 250$	200	GKU30010
6.8	40.0	$N2200 \pm 800$	200	GKU40010
9.8	50.0	$N2200 \pm 800$	200	GKU50010
12.0	60.0	$N2200 \pm 800$	200	GKU60010
14.0	70.0	$N2200 \pm 800$	200	GKU70010



ECONOMY 7 mm GKT SERIES

FEATURES

- Economical for consumer and industrial applications.
- Rotor soldered to tuning axle for stability.
- For lead-through-hole connection to printed circuit boards.
- Three hole mounting pattern.

SPECIFICATIONS

Operating Temperature Range: -25°C to $+85^{\circ}\text{C}$

Voltage Rating: 250 VDC

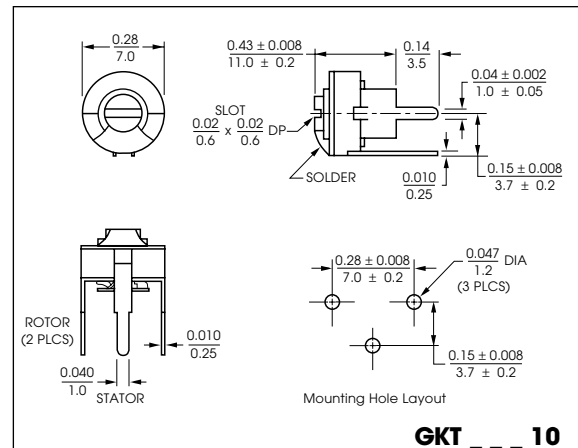
Dielectric Withstanding Voltages: 500 VDC

Insulation Resistance: 10^4 Megohms min

Torque: 35 to 200 g-cm (0.49 to 2.8 oz-in)

7 mm Economy Models

Capacitance Range (pF)		TCC (ppm/ $^{\circ}\text{C}$)	Q min (1 MHz)	Model No.
min	max			
2.0	5.0	0 ± 250	300	GKT5R010
3.0	10.0	0 ± 250	300	GKT10010
4.0	20.0	$N750 \pm 250$	300	GKT20010
5.0	30.0	$N1000 \pm 500$	300	GKT30010
7.0	45.0	$N1000 \pm 500$	200	GKT45010
9.0	63.0	$N1000 \pm 500$	200	GKT60010
12.0	90.0	$N2200 \pm 800$	200	GKT90010
14.0	108.0	$N2200 \pm 800$	100	GKT10110



All dimensions are in / mm. Unless otherwise specified, the tolerance on dimensions is $\pm 0.004/0.1$.

THIN 2 mm & 3 mm TYPES

FEATURES

- Very small size — for hybrid circuit applications.
- Straight line capacitance curve.
- Choice of mounting styles.

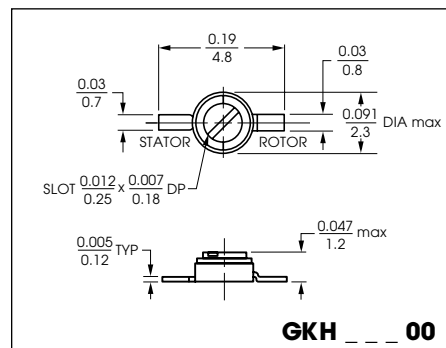
SPECIFICATIONS

Operating
Temperature Range: -25°C to $+85^{\circ}\text{C}$
Voltage Rating: 25 VDC
Dielectric Withstanding Voltages: 75 VDC
Insulation Resistance: 10^4 Megohms min
Torque: 10 to 75 g-cm (0.14 to 1.0 oz-in)
Terminal Plating: Silver

MINIATURE SERIES 2.0 x 1.2 mm Models

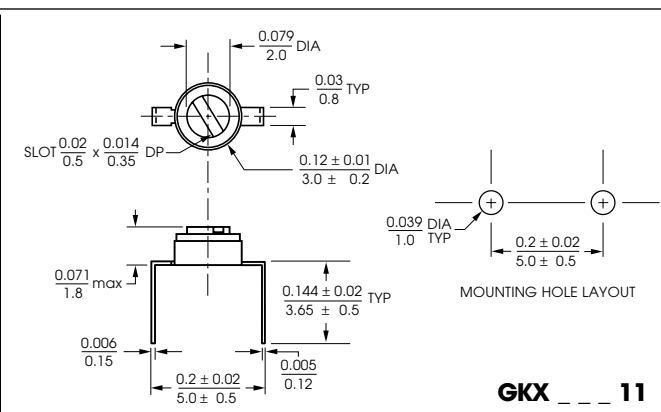
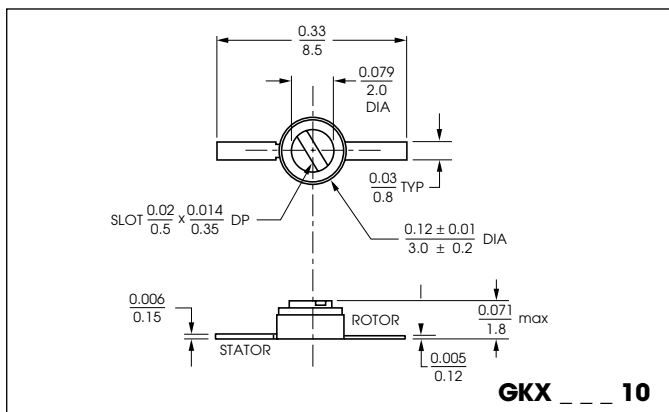
Capacitance (pF)		TCC (ppm / $^{\circ}\text{C}$)	Q min (1 MHz)	Model No.
min*	max			
5.0	25.0	$N1200 \pm 800$	100	GKH25000

*Re-rated in 1996



3.0 x 1.8 mm Models

Capacitance (pF)		TCC (ppm / $^{\circ}\text{C}$)	Q min (1 MHz)	Model No.	Model No.
min	max				
1.0	3.0	0 ± 300	200	GKX3R010	GKX3R011
1.5	5.0	0 ± 300	200	GKX5R010	GKX5R011
2.5	10.0	0 ± 300	200	GKX10010	GKX10011
5.0	20.0	$N750 \pm 500$	200	GKX20010	GKX20011
5.0	30.0	$N750 \pm 500$	200	GKX30010	GKX30011
5.0	35.0	$N750 \pm 500$	200	GKX35010	GKX35011
6.0	40.0	$N750 \pm 500$	200	GKX40010	GKX40011



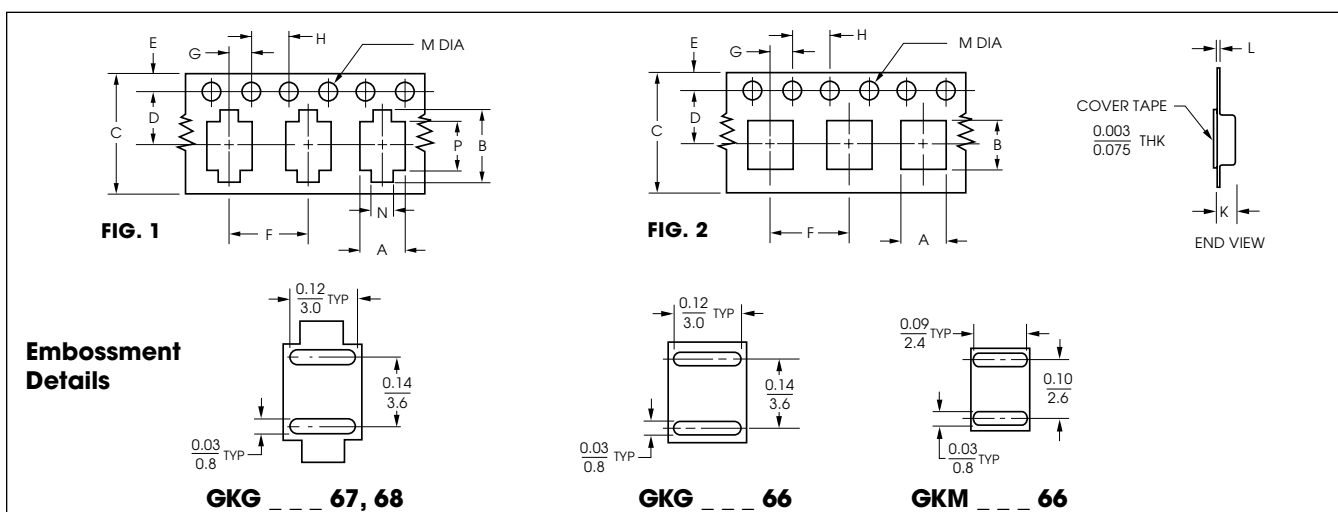
All dimensions are in / mm.
Unless otherwise specified, the tolerance on dimensions is $\pm 0.004/0.1$.

CARRIER AND REEL SPECIFICATIONS

CARRIER

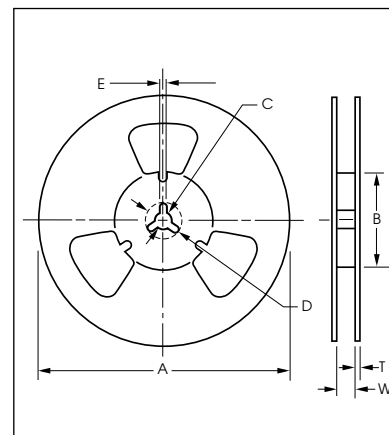
Product Line	Dimension Tolerance	A	B	C	D	E	F	G	H	K	L	M	N	P
		$\pm \frac{0.004}{0.1}$	$\pm \frac{0.004}{0.1}$	$\pm \frac{0.01}{0.3}$	$\pm \frac{0.004}{0.1}$	$\pm \frac{0.004}{0.1}$	$\pm \frac{0.004}{0.1}$	$\pm \frac{0.004}{0.1}$	$\pm \frac{0.004}{0.1}$	$\pm \frac{0.008}{0.2}$	$\pm \frac{0.002}{0.05}$	$\pm \frac{0.004}{0.1}$	$\pm \frac{0.004}{0.1}$	$\pm \frac{0.004}{0.1}$
GKG_ _ _ 66	Fig. 2	$\frac{0.18}{4.5}$	$\frac{0.21}{5.4}$	$\frac{0.47}{12}$	$\frac{0.22}{5.5}$	$\frac{0.069}{1.75}$	$\frac{0.31}{8.0}$	$\frac{0.08}{2.0}$	$\frac{0.2}{4}$	$\frac{0.13}{3.2}$	$\frac{0.01}{0.3}$	$\frac{0.059}{1.5}$	—	—
GKG_ _ _ 67, 68	Fig. 1	$\frac{0.18}{4.5}$	$\frac{0.30}{7.5}$	$\frac{0.47}{12}$	$\frac{0.22}{5.5}$	$\frac{0.069}{1.75}$	$\frac{0.31}{8.0}$	$\frac{0.08}{2.0}$	$\frac{0.2}{4}$	$\frac{0.13}{3.2}$	$\frac{0.01}{0.3}$	$\frac{0.059}{1.5}$	$\frac{0.08}{2.0}$	$\frac{0.2}{5}$
GKM_ _ _ 66	Fig. 2	$\frac{0.14}{3.6}$	$\frac{0.18}{4.5}$	$\frac{0.47}{12}$	$\frac{0.22}{5.5}$	$\frac{0.069}{1.75}$	$\frac{0.2}{4}$	$\frac{0.08}{2.0}$	$\frac{0.2}{4}$	$\frac{0.091}{2.3}$	$\frac{0.01}{0.3}$	$\frac{0.059}{1.5}$	—	—
GKP_ _ _ 66	Fig. 2	$\frac{0.11}{2.7}$	$\frac{0.14}{3.6}$	$\frac{0.3}{8}$	$\frac{0.14}{3.5}$	$\frac{0.069}{1.75}$	$\frac{0.2}{4}$	$\frac{0.08}{2.0}$	$\frac{0.2}{4}$	$\frac{0.075}{1.9}$	$\frac{0.01}{0.3}$	$\frac{0.059}{1.5}$	—	—
GKY_ _ _ 66	Fig. 2	$\frac{0.14}{3.6}$	$\frac{0.19}{4.9}$	$\frac{0.47}{12}$	$\frac{0.22}{5.5}$	$\frac{0.069}{1.75}$	$\frac{0.31}{8.0}$	$\frac{0.08}{2.0}$	$\frac{0.2}{4}$	$\frac{0.091}{2.3}$	$\frac{0.01}{0.3}$	$\frac{0.059}{1.5}$	—	—

NOTE: SURFTRIM® capacitors in compartments (blisters) have stator terminal nearest "M" holes. "A" suffix specifies rotor terminal closer to "M" holes.



REEL

Product Line	Quantity Per Reel	Dimension Tolerance	A	B	C	D	E	T	W
			$\pm \frac{0.1}{3}$	$\pm \frac{0.1}{3}$	$\pm \frac{0.04}{1}$	$\pm \frac{0.08}{2}$	$\pm \frac{0.04}{1}$	$\pm \frac{0.02}{0.5}$	$\pm \frac{0.08}{2}$
GKG_ _ _ 66-07, 67-07, 68-07	700		$\frac{7.09}{180}$	$\frac{2.4}{60}$	$\frac{0.51}{13}$	$\frac{0.91}{23}$	$\frac{0.08}{2}$	$\frac{0.043}{1.1}$	$\frac{0.531}{13.5}$
GKG_ _ _ 66-25, 67-25, 68-25	2500		$\frac{13.0}{330}$	$\frac{3.1}{80}$	$\frac{0.51}{13}$	$\frac{0.91}{23}$	$\frac{0.098}{2.5}$	$\frac{0.079}{2.0}$	$\frac{0.531}{13.5}$
GKM_ _ _ 66	2000		$\frac{7.09}{180}$	$\frac{2.4}{60}$	$\frac{0.51}{13}$	$\frac{0.91}{23}$	$\frac{0.08}{2}$	$\frac{0.043}{1.1}$	$\frac{0.531}{13.5}$
GKP_ _ _ 66	2000		$\frac{7.09}{180}$	$\frac{2.4}{60}$	$\frac{0.51}{13}$	$\frac{0.91}{23}$	$\frac{0.08}{2}$	$\frac{0.043}{1.1}$	$\frac{0.37}{9.5}$
GKY_ _ _ 66, 76	1000		$\frac{7.09}{180}$	$\frac{2.4}{60}$	$\frac{0.51}{13}$	$\frac{0.91}{23}$	$\frac{0.08}{2}$	$\frac{0.043}{1.1}$	$\frac{0.531}{13.5}$



All dimensions are in /mm.
Unless otherwise specified, the tolerance on dimensions is $\pm 0.004/0.1$.



SPECIFICATION NOTES

1. Parts are 100% tested for capacitance range, dielectric withstanding voltage, insulation resistance, and torque.
2. Capacitance range specified is that which is guaranteed, and is measured at 1 MHz and 25°C.
3. For soldering SURFTRIM® surface mounting models, pre-heat at 140°C $\pm$ 10°C for 2 minutes maximum, and reflow solder at 240°C $\pm$ 5°C for 20 seconds maximum.
4. For soldering printed circuit board mounting models, solder at 260°C $\pm$ 10°C for 5 seconds maximum, except 3 seconds maximum for Miniature Models (page 10).
5. Q factor is measured at maximum rated capacitance and at room temperature. Frequency of measurement is as listed for each model.
6. Dielectric strength is measured at maximum rated capacitance and room temperature, with test voltage as listed for each model applied for 5 seconds.
7. Insulation resistance is measured at maximum rated capacitance and room temperature and at rated voltage, unless otherwise specified.
8. Temperature coefficient of capacitance (TCC) is measured at 100 kHz or 1 MHz, over a temperature range of -20°C to +70°C with capacitor set at maximum rated capacitance.
9. Axial load during tuning should not exceed 250 grams.
10. Capacitors should not be operated outside of rated capacitance range and working voltage.
11. Angular orientation of adjusting slot is random.

APPLICATION NOTES

Soldering and Cleaning of Ceramic Trimmer Capacitors

Soldering temperatures and times are specified in Notes 3 and 4 above. If using an iron for manual soldering (for prototyping or repairs, for example) use an appropriate size and temperature so that the high temperature exposure of the trimmer is less than 3 seconds.

We strongly recommend the use of water soluble fluxes for soldering, followed by cleaning in water containing detergents, and then a clear water rinse.

Some operations still use Freon or similar fluorinated or chlorinated hydrocarbon solvents. These solvents have a tendency to remove the lubricant, which in turn makes for bumpy adjustment, and will degrade the tuning torque, adjustment life, and other mechanical specifications.

In general, the minimum exposure to cleaning solutions is recommended. The gentlest would be the detergent and water rinses at fairly low temperatures. When chlorinated or fluorinated hydrocarbons are used, the boards should never be plunged into the solvent solution, but rather maintained in the vapor area of the defluxing equipment, and for the minimum possible time. Most desirable would be to clean only the bottom of the printed circuit board, as with board scrubbers.

The unsealed GKG models are usually specified for consumer applications where cleaning after soldering is normally not required. Should cleaning be required, the method to use would be to clean the bottom of the board, as with board scrubbers. If a solvent is used when cleaning the GKG series, sealed versions should be specified to prevent the solvent from being trapped in the housing and degrading performance.

Other precautions for using ceramic trimmer capacitors include:

- Beware of excessive handling with bare hands as, "finger oil" and dirt can bring down Q and insulation resistance values.
- Terminals should not be cut or reformed, as this could cause deformation of the spring or breaking of the rotor.

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