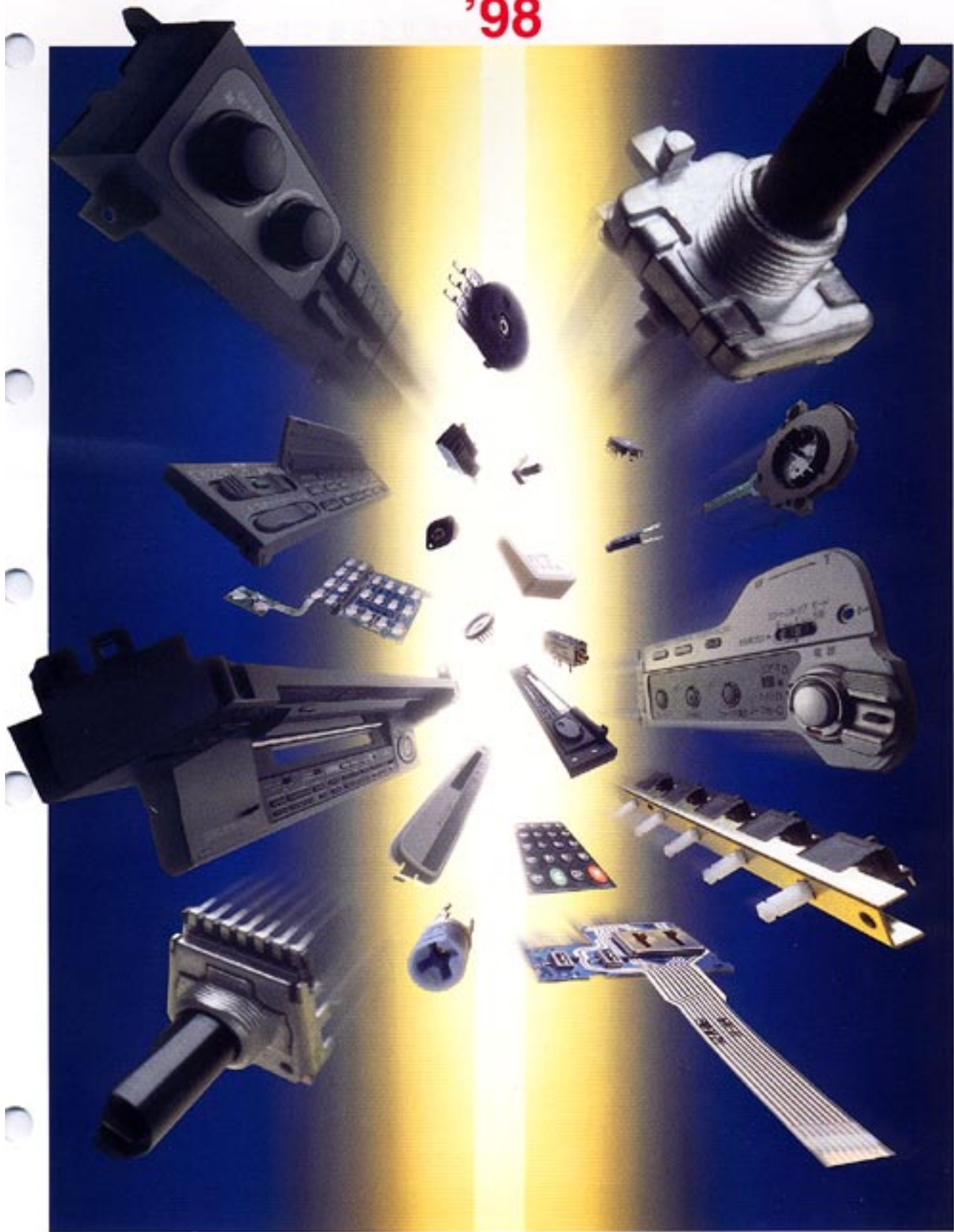


NOBLE®

ELECTRONIC COMPONENTS CATALOG

'98



TEIKOKU TSUSHIN KOGYO CO., LTD.


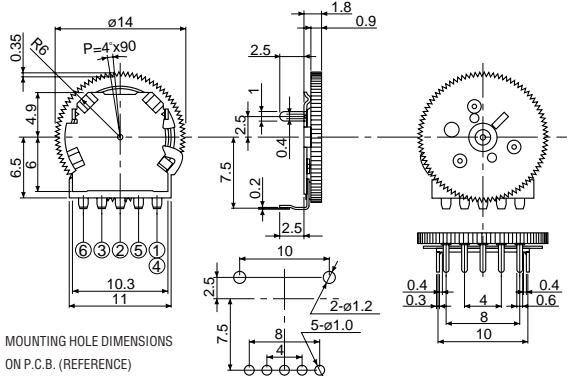
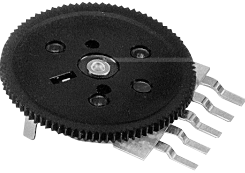
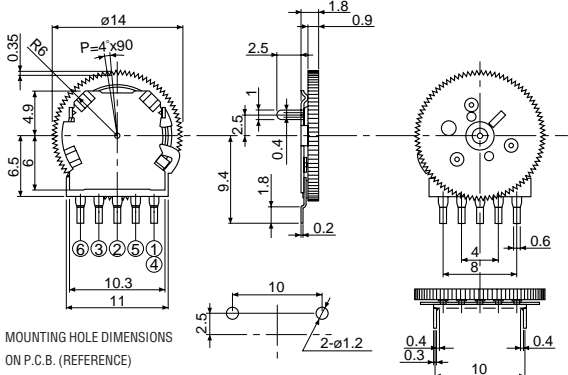
Miniature Potentiometers XV102G,XV081N,XV082G

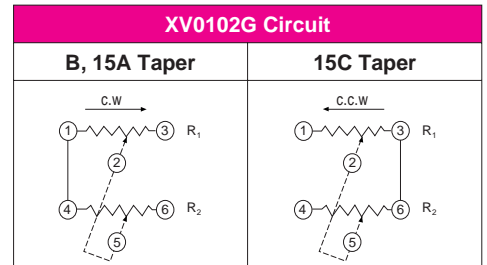
FEATURES

- High performance miniature potentiometer created by incorporating NOBLE's ICB(Integrated Control Block)film integration technology.
- Ideally suited for Headphone stereos,and other pocketable audio equipment.
- Film makes smooth rotational feeling possible.
- Reflow soldering type available consult NOBLE.

APPLICATIONS

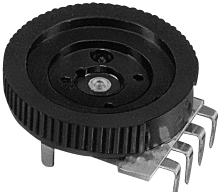
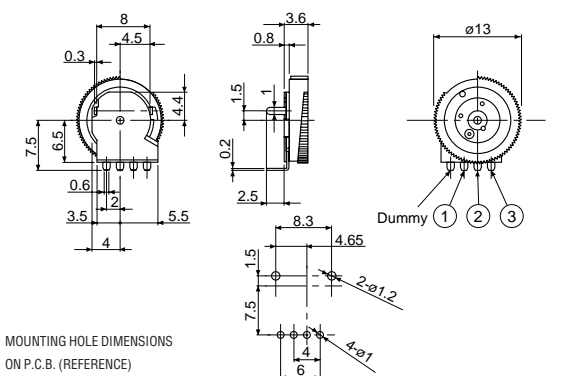
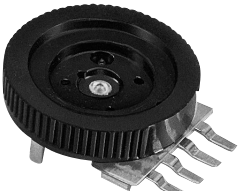
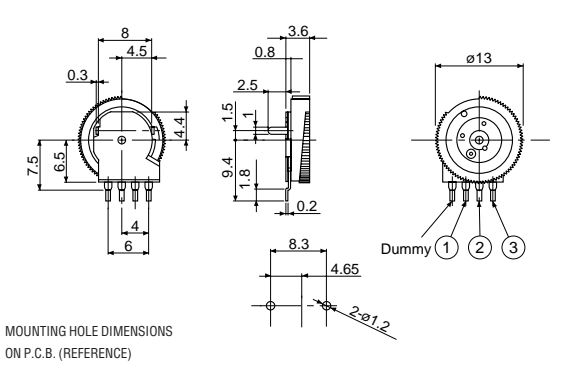
Headphone stereos,Portable CD,CD-ROM,Game Machines,Liquid Crystal TVs,Electronic Pocket Notebook,Personal Computer · Word Processors,Pocket Radio,and other Pocketable Equipments.

XV0102GPV1N	  <p>MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)</p>
XV0102GPH1N	  <p>MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)</p>



SPECIFICATIONS

Total Rotational Angle	270±5°
Rotational Torque	1~10mN·m
Nominal Total Resistance	1B: 1kΩ, 2kΩ, 3kΩ, 5kΩ, 10kΩ, 20kΩ, 30kΩ, 50kΩ, 100kΩ, 200kΩ, 300kΩ, 500kΩ 15A/15C: 5kΩ, 10kΩ, 20kΩ, 30kΩ, 50kΩ, 100kΩ, 200kΩ, 300kΩ, 500kΩ
Total Resistance	Within 20% of the nominal total resistance.
Resistance Taper	1B(Linear), 15A(Audio), 15C(Revers Audio)
Maximum Rated Voltage	AC10V,DC10V
Rated Power	0.05W
Tracking Error	Within ±4dB at a range of 0~-40dB except 1B taper.

XV081PV1N	  <p>MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)</p>
XV081PH1N	  <p>MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)</p>

SPECIFICATIONS

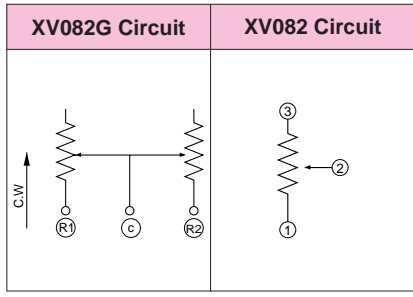
Total Rotational Angle	300±5°
Rotational Torque	1~10mN·m
Nominal Total Resistance	1B: 2kΩ, 3kΩ, 5kΩ, 10kΩ, 20kΩ, 30kΩ, 50kΩ, 100kΩ, 200kΩ, 300kΩ, 500kΩ 15A/15C: 5kΩ, 10kΩ, 20kΩ, 30kΩ, 50kΩ, 100kΩ, 200kΩ, 300kΩ, 500kΩ
Total Resistance	Within 20% of the nominal total resistance.
Resistance Taper	1B(Linear), 15A(Audio), 15C(Revers Audio)
Maximum Rated Voltage	AC10V,DC10V
Rated Power	0.05W

Various knobs are available. Consult with Noble.

- Specifications in this catalog are presented basically for informative purposes. We request the exchange of official approval drawings before placing order.

Miniature Potentiometers

XV082GPHIN	<p style="text-align: center;">MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)</p>
XV082PHIN	



SPECIFICATIONS

	XV082GPHIN	XV082PHIN
Total Rotational Angle	120±5°	300±5°
Rotational Torque	1-10mN·m	
Nominal Total Resistance	1B: 500Ω, 1kΩ, 2kΩ, 3kΩ, 5kΩ, 10kΩ, 20kΩ, 30kΩ, 50kΩ, 100kΩ, 200kΩ, 15A/15C: 2kΩ, 3kΩ, 5kΩ, 10kΩ, 20kΩ, 30kΩ, 50kΩ, 100kΩ	1B: 2kΩ, 3kΩ, 5kΩ, 10kΩ, 20kΩ, 30kΩ, 50kΩ, 100kΩ, 200kΩ, 300kΩ, 500kΩ, 15A/15C: 5kΩ, 10kΩ, 20kΩ, 30kΩ, 50kΩ, 100kΩ, 200kΩ, 300kΩ, 500kΩ
Total Resistance	Within 20% of the nominal total resistance.	
Resistance Taper	1B(Linear), 15A(Audio), 15C(Revers Audio)	
Maximum Rated Voltage	AC10V, DC10V	
Rated Power	0.05W	

VO9L	<p style="text-align: center;">MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p>
V105-4PVN	<p style="text-align: center;">MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p>

SPECIFICATIONS

	VO9L
Total Rotational Angle	230±5°
Rotational Torque	1-10mN·m(10-102gf·cm)
Resistance Range	1kΩ - 500kΩ (taper B) 5kΩ - 250kΩ (other taper)
Rated Power	0.05W (taper B) 0.025W (other taper)
Maximum Rated Voltage	AC10V, DC10V

SPECIFICATIONS

	V105-4PVN
Total Rotational Angle	200±10°
Rotational Torque	2-15mN·m(20-153gf·cm)
Resistance Range	1kΩ - 500kΩ (taper B) 1kΩ - 500kΩ (other taper)
Rated Power	0.07W (taper B) 0.03W (other taper)
Maximum Rated Voltage	AC100V, DC100V (taper B) AC70V, DC70V (other taper)

Joystick Control Potentiometer VL201

	<p>MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)</p>
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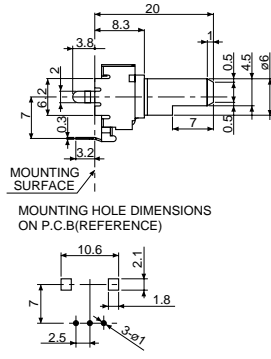
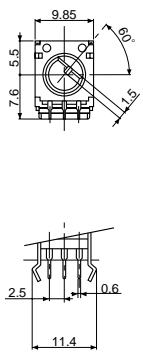
SPECIFICATIONS


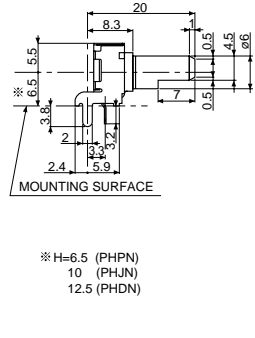
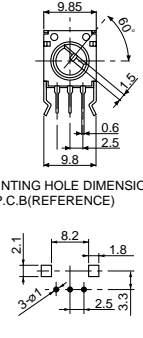
Total Rotational Angle	60±10°
Rotational Torque	1-10mN·m(10-102gf·cm)
Resistance Range	1kΩ - 500kΩ (taper B)
Rated Power	0.01W
Maximum Rated Voltage	AC10V, DC10V

9mm Size Snap-In Insulated Shaft Potentiometers

FEATURES

- High performance miniature potentiometer created by incorporating NOBLE's Film Integration Technology.
- Film element provides smooth rotational feeling.

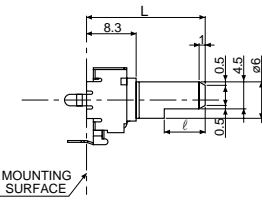
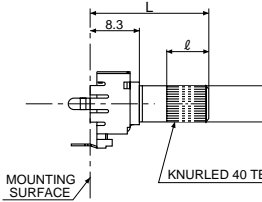
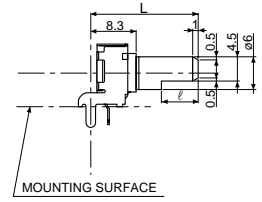
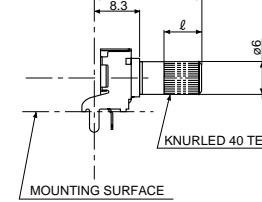
XV092PVN (Insulated Shaft)	External Dimensions	Unit : mm
	 <p>MOUNTING SURFACE</p> <p>MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p>	

XV092PHPN (Insulated Shaft)	External Dimensions	Unit : mm
	 <p>MOUNTING SURFACE</p> <p>※ H=6.5 (PHPN) 10 (PHJN) 12.5 (PHDN)</p>	 <p>MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p>

SHAFT DIMENSIONS

	Type F (Flat type)	Type U (Knurl type)
Shaft Length (L : mm)	15 ○ (ℓ =6mm) 20 ○ (ℓ =7mm) 25 ○ (ℓ =12mm) 30 ○ (ℓ =12mm)	○ (ℓ =6mm) ○ (ℓ =7mm) ○ (ℓ =7mm)

SHAFT DESIGN

Type F	Type U
 <p>MOUNTING SURFACE</p>	 <p>MOUNTING SURFACE</p> <p>KNURLED 40 TEETH</p>
 <p>MOUNTING SURFACE</p>	 <p>MOUNTING SURFACE</p> <p>KNURLED 40 TEETH</p>

SPECIFICATIONS

Total Rotational Angle	300±5° (280±5° option : Model XV09202)
Rotational Torque	1~8mN·m
Nominal Total Range	5kΩ, 10kΩ, 20kΩ, 50kΩ, 100kΩ, 200kΩ, 500kΩ
Resistance Tolerance	Within ±20% of the nominal total resistance
Resistance Taper	1B, 15A, 15C
Rated Power	0.05W
Maximum Rated Voltage	AC 50V, DC 20V

- Specifications in this catalog are presented basically for informative purposes. We request the exchange of official approval drawings before placing order.

12mm and 14mm Size Snap-In Insulated Shaft Potentiometers

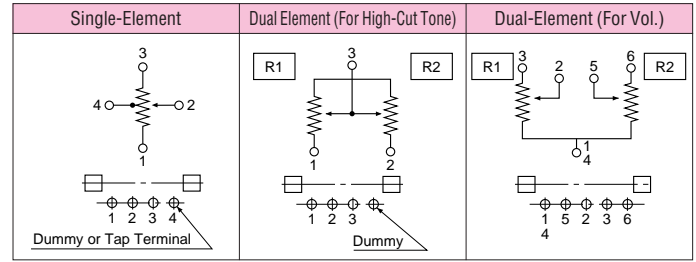
FEATURES

- High reliable potentiometer created by Noble's own connection method between terminals and resistive element.
- Film makes smooth rotational feeling possible.
- Unit with or without bushing are available together with tap and detent.
- Even 12mm version can be provided with dual unit for Volume control.

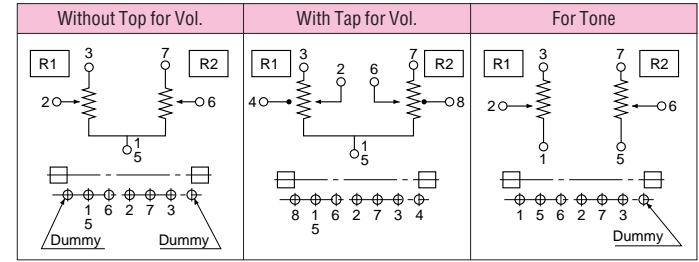
APPLICATIONS

Various Potentiometers for volume, tone, balance and microphone volume control etc. of Radio, Radio-Cassette-Recorder(with or without CD), Amplifier, Mixer etc.

12mm Size, Mounting Detail and Circuit Diagram. XV012, XVB12



14mm Size, Mounting Detail and Circuit Diagram. XV0141, XVB141



XV0121PHN
XV0121GPHN

MOUNTING SURFACE
MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)

With Bushing

XVB121PHN
XVB121GPHN

MOUNTING SURFACE
MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)

With Bushing

XV0121PVN
XV0121GPVN

MOUNTING SURFACE
MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)

With Bushing

XVB121PVN
XVB121GPVN

MOUNTING SURFACE
MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)

With Bushing

XV0122GPHN

MOUNTING SURFACE
MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)

With Bushing

XVB122GPHN

MOUNTING SURFACE
MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)

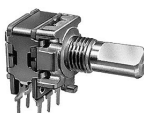
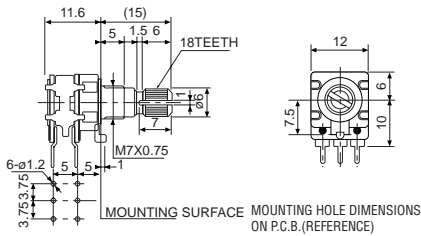

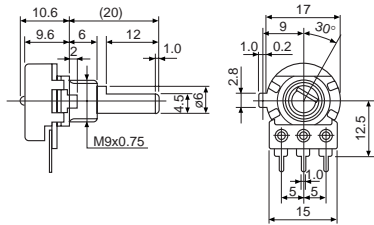

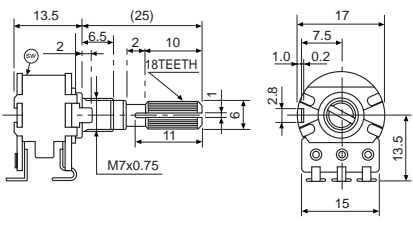
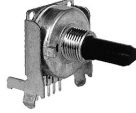
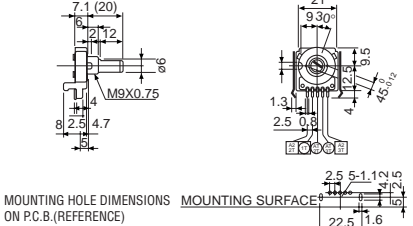

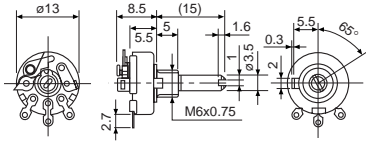
With Bushing

XV0122GPVN		XVB122GPVN	
XV0141GPHN		XVB141GPHN	
XV0141GPVN		XVB141GPVN	

SPECIFICATIONS


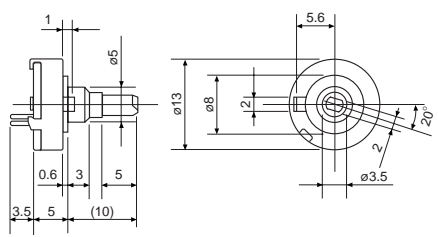
	Single-Element	Dual-Element For High-Cut Tone	Dual-Element	Dual-Element
	XV0121,XVB121	XV0121G,XVB121G	XV0122G,XVB122G	XV0141G,XVB141G
Rated Power	0.05W	Operating Current 1mA A.C. only	0.05W	0.05W
Maximum Rated Voltage	AC 50V,DC 20V	AC 30V(for A.C. only)		AC 50V(for A.C. only)
Nominal Total Resistance	5k Ω ,10k Ω ,20k Ω ,50k Ω ,100k Ω ,200k Ω ,500k Ω	5k Ω ,10k Ω ,20k Ω ,50k Ω	5k Ω ,10k Ω ,20k Ω ,50k Ω ,100k Ω ,200k Ω ,500k Ω	
Resistance Taper	1B,3B,10A,15A,15C,25A,25C	1B,10A,15A	3B,10A,15A	1B,3B,10A,15A,15C,25A,25C,1Z
Tracking Error	—	—	(For Volume Control) Within ± 3 dB at a range of 0 - 40dB (For Tone Control) Within ± 2 dB at center	
Total Rotational Angle	300 \pm 5°			
Rotational Torque	Without bushing 0.5N-m (5.1kgf-cm)		With bushing 0.6N-m (6.1kgf-cm)	
Center Detent	●	●	●	●
Center Tap	●	—	—	●

Potentiometers

<p>V12LG3PH2JN</p> 			
<p>VB16L43(PH2D)N (Insulated Shaft)</p> 		<p>V16L4S(C26) (with Switch)</p> 	
<p>VB161GPHN (Insulated Shaft)</p> 		<p>V12M4-1S (with Switch)</p> 	

	V12LG3	VB16L43	VB161G	V16L4S(C26)	V12M4-1S
Rotational Angle	300±5°	300±5°	300±5°	300±5°	230±10°
Rotational Torque	2-25mN·m {20-255gf·cm}	3-20mN·m {31-204gf·cm}	3-30mN·m {31-306gf·cm}	3-20mN·m {31-204gf·cm}	2-20mN·m {20-204gf·cm}
Resistance Range	1kΩ-500kΩ (taper B) 5kΩ-500kΩ (other taper)	500Ω-1MΩ (taper B) 5kΩ-1MΩ (other taper)	1kΩ-500kΩ (taper B) 5kΩ-500kΩ (other taper)	500Ω-1MΩ (taper B) 5kΩ-1MΩ (other taper)	1kΩ-500kΩ (taper B) 5kΩ-500kΩ (other taper)
Rated Power	0.05W	0.15W (taper B) 0.1W (other taper)	0.06W	0.2W (taper B) 0.1W (other taper)	0.08W (taper B) 0.04W (other taper)
Rated Voltage	AC 30V, DC 30V	AC 200V AC, DC 10V (taper B) AC 150V, DC 10V (other taper)	AC 10V, DC 10V	AC 200V, DC 200V (taper B) AC 150V, DC 150V (other taper)	AC 150V, DC 150V (taper B) AC 100V, DC 100V (other taper)
Switch Rating	—	—	—	12V DC, 1A (SPST)	DC 12V, 0.5A (SPST)


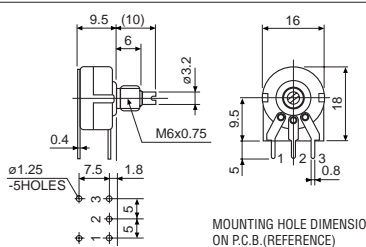
Long Life-Potentiometer

<p>TR133</p> 	
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SPECIFICATIONS

Rotational Angle	220±5°
Rotational Torque	4mN·m (41gf·cm) or less
Resistance Range	5kΩ-100kΩ (taper B)
Resistance Tolerance	±20%
Rated Power	0.125W
Maximum Rated Voltage	AC 10V, DC 10V
Operating Life	500,000 cycles

Potentiometer for Industrial Applications

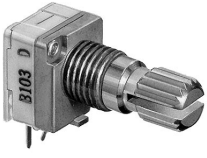
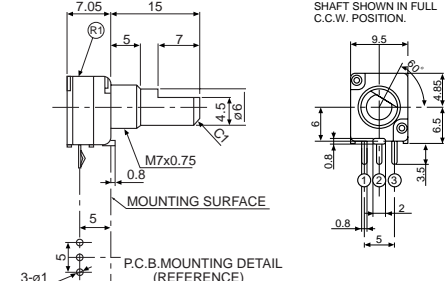
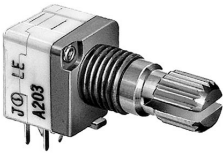
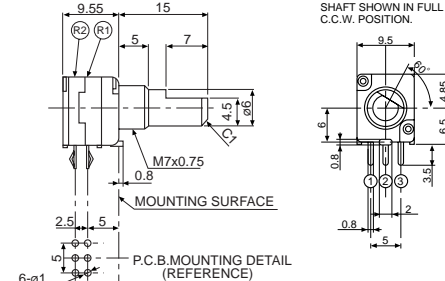
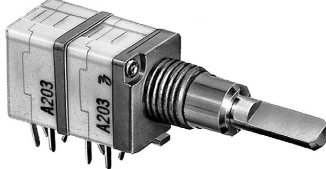
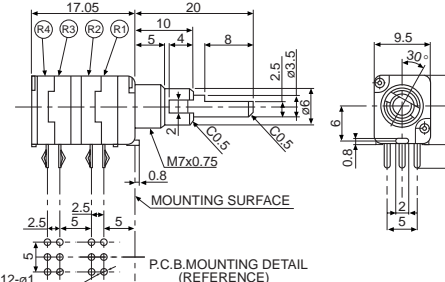
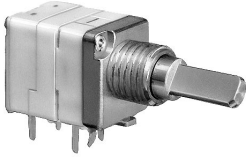
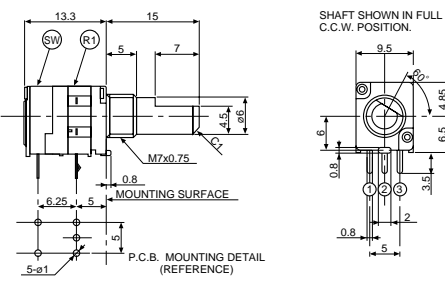
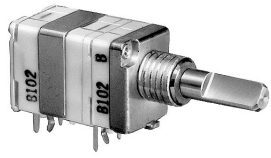
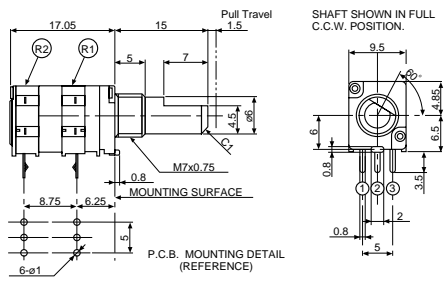

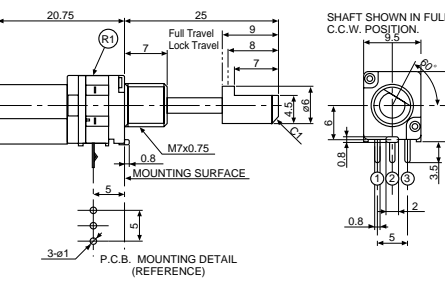
<p>RV16YP</p> 	
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SPECIFICATIONS

Rotational Angle	260±10°
Rotational Torque	2-20mN·m (20-204gf·cm)
Resistance Range	100Ω-1MΩ (taper B) 500Ω-1MΩ (other taper)
Resistance Tolerance	±10%
Rated Power	0.1 W (taper B) 0.05 W (other taper)
Maximum Rated Voltage	AC 200V, DC 200V (taper B) AC 150V, DC 150V (other taper)
Operating Life	15,000 cycles

Multi-Section Potentiometer for Car-Audio

XVB93 Series

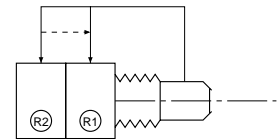
<p>XVB93PHPN</p> <p>Single-Element</p> 	 <p>SHAFT SHOWN IN FULL C.C.W. POSITION.</p> <p>MOUNTING SURFACE</p> <p>P.C.B. MOUNTING DETAIL (REFERENCE)</p>
<p>XVB93GPHPN</p> <p>Dual-Element</p> 	 <p>SHAFT SHOWN IN FULL C.C.W. POSITION.</p> <p>MOUNTING SURFACE</p> <p>P.C.B. MOUNTING DETAIL (REFERENCE)</p>
<p>XVB93DG4PHPN</p> <p>Dual Concentric Shaft (Dual-Element) × 2</p> 	 <p>MOUNTING SURFACE</p> <p>P.C.B. MOUNTING DETAIL (REFERENCE)</p>
<p>XVB93S (97ST)</p> <p>with Rotary Switch</p> 	 <p>SHAFT SHOWN IN FULL C.C.W. POSITION.</p> <p>MOUNTING SURFACE</p> <p>P.C.B. MOUNTING DETAIL (REFERENCE)</p>
<p>XVB93M3-5N</p> 	 <p>SHAFT SHOWN IN FULL C.C.W. POSITION.</p> <p>MOUNTING SURFACE</p> <p>P.C.B. MOUNTING DETAIL (REFERENCE)</p>
<p>XVB93M1N</p> 	 <p>SHAFT SHOWN IN FULL C.C.W. POSITION.</p> <p>MOUNTING SURFACE</p> <p>P.C.B. MOUNTING DETAIL (REFERENCE)</p>

SPECIFICATIONS

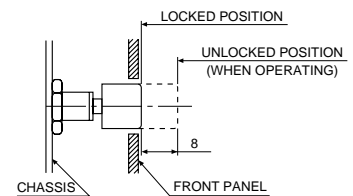
Total Rotational Angle	300±5°
Rotational Torque	Single Shaft Type : 2 to 15 mN·m Dual-Shaft (Inner) Type : 2 to 15 mN·m Dual-Shaft (Outer) Type : 2 to 20 mN·m
Nominal Total Resistance	20kΩ, 50kΩ, 100kΩ
Resistance Tolerance	Within±20% of the nominal total resistance
Resistance Taper	1B, 3B, 3BM, 15A, 15AM
Rated Power	0.05W
Maximum Rated Voltage	AC50V, DC10V

Switch Rating: DC16V 3A (SPST)

- (R1) : Pull Position Control
- (R2) : Normal-Position Control



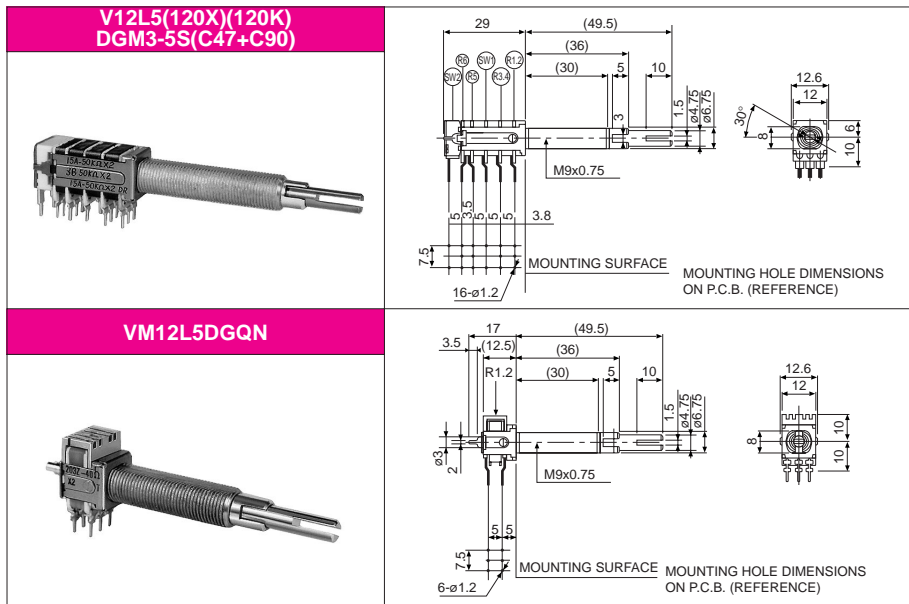
Push-Lock mechanism



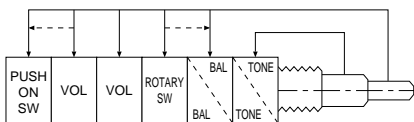
• Specifications in this catalog are presented basically for informative purposes. We request the exchange of official approval drawings before placing order.

Multi-Section Potentiometer for Car-Audio

V12L5 Series



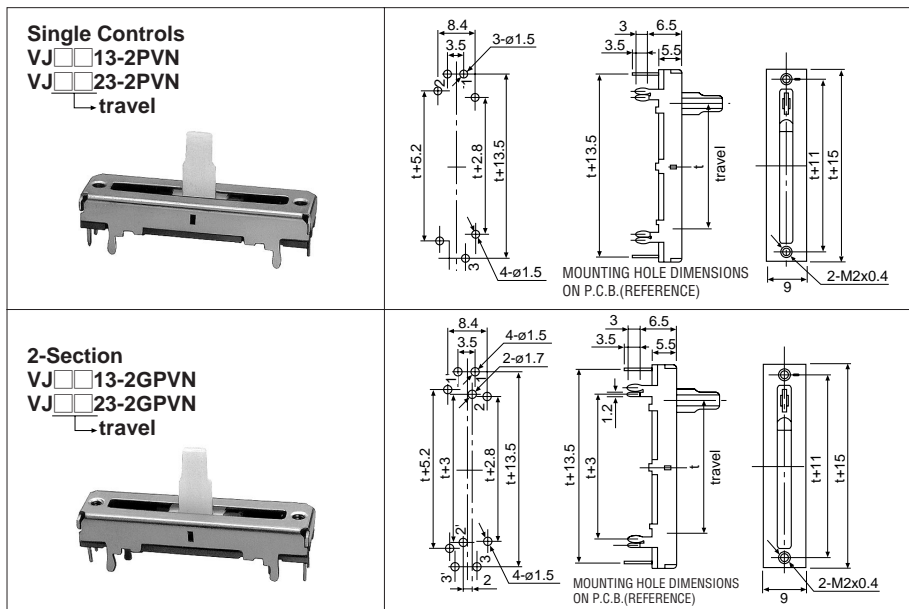
Pull - balance



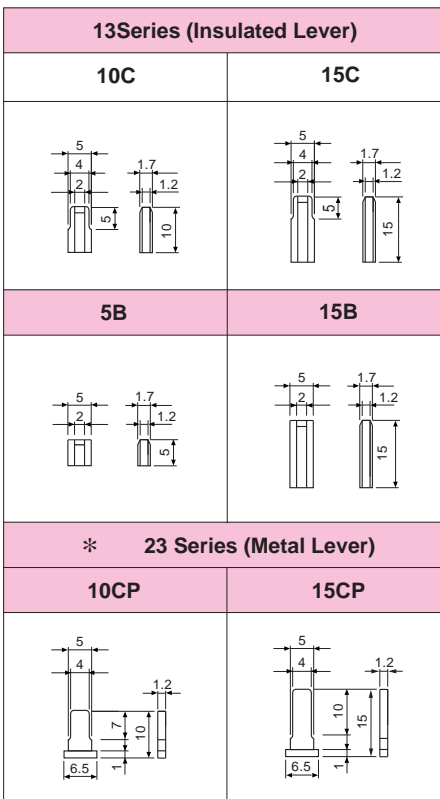
Fader Control with Tuning Shaft

Rotational Angle	180±5°
Rotational Torque	3~35mN·m(31-357gf·cm)
Resistance Range	20Ω-200Ω
Rated Power	2.5WDC(8Ω load)
Rated Voltage	DC 9V

Low Profile Slide Potentiometer 13, 23 Series



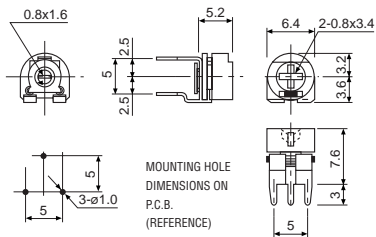
"t" in outline drawings denotes a travel.



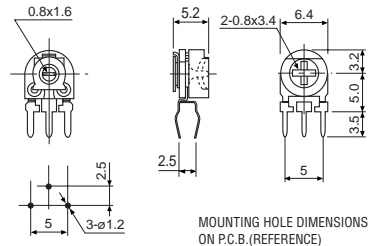
Travel	Function	Model	Sliding Force	Resistance Range	Rated Power	Rated Voltage	f (mm)
15mm	Single	VJ1513-2PVN *VJ1523-2PVN	0.5~3.5N (51~357gf)	1kΩ~1MΩ(taper B)	0.05W(taper B) 0.025W(other taper)	AC 100V,DC 10V(taper B) AC 50V,DC 10V(other taper)	15
	2-section	VJ1513-2GPVN *VJ1523-2GPVN		2kΩ~500kΩ(other taper)			
20mm	Single	VJ2013-2PVN *VJ2023-2PVN	0.5~3.5N (51~357gf)	1kΩ~1MΩ(taper B)	0.06W(taper B) 0.03W(other taper)	AC 150V,DC 10V(taper B) AC 100V,DC 10V(other taper)	20
	2-section	VJ2013-2GPVN *VJ2023-2GPVN		2kΩ~500kΩ(other taper)			
30mm	Single	VJ3013-2PVN *VJ3023-2PVN	0.5~3.5N (51~357gf)	2kΩ~1MΩ(taper B)	0.1W(taper B) 0.05W(other taper)	AC 200V,DC 10V(taper B) AC 150V,DC 10V(other taper)	30
	2-section	VJ3013-2GPVN *VJ3023-2GPVN		3kΩ~1MΩ(other taper)			
45mm	Single	VJ4513-2PVN *VJ4523-2PVN	0.5~3.5N (51~357gf)	2kΩ~1MΩ(taper B)	0.1W	AC 200V,DC 10V(taper B) AC 150V,DC 10V(other taper)	45
	2-section	VJ4513-2GPVN *VJ4523-2GPVN		5kΩ~1MΩ(other taper)			
60mm	Single	VJ6013-2PVN *VJ6023-2PVN	0.5~3.5N (51~357gf)	2kΩ~1MΩ(taper B)	0.2W	AC 250V,DC 10V(taper B) AC 180V,DC 10V(other taper)	60
	2-section	VJ6013-2GPVN *VJ6023-2GPVN		5kΩ~1MΩ(other taper)			

Carbon Film Trimmer Potentiometers

V6EK-PV(1S)



V6EK-PH(1S)


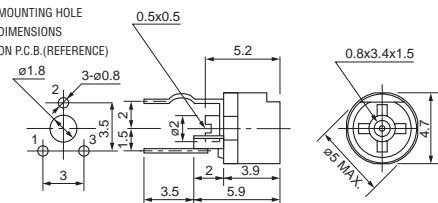

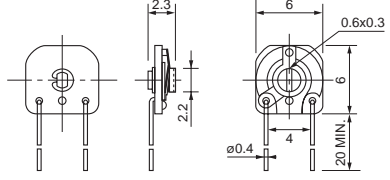

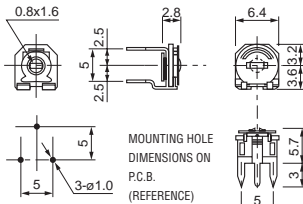

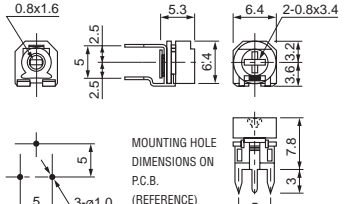

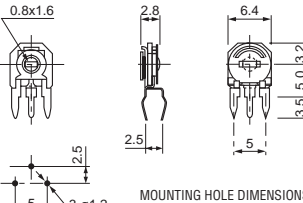

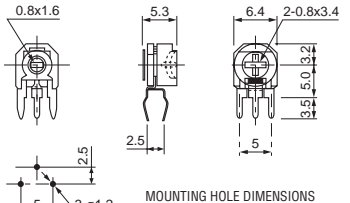

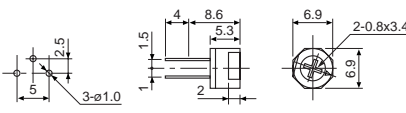

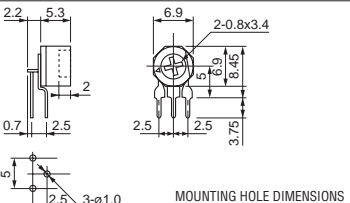

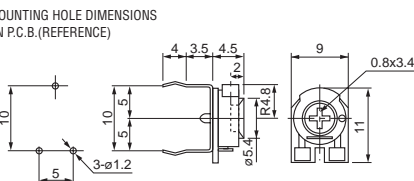

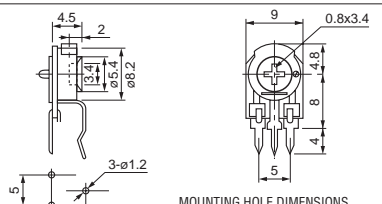

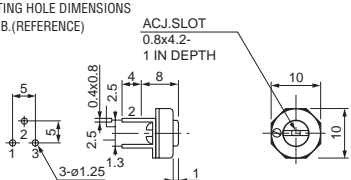

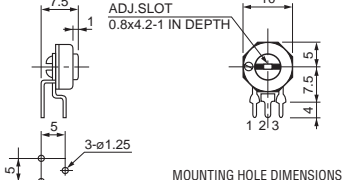


	V6EK
Rotational Angle	200 \pm 10°
Rotational Torque	3~30mN·m(31-306gf·cm)
Resistance Range	500 Ω -1M Ω (Taper B)
Resistance Tolerance	\pm 30%
Rated Power	0.1W
Maximum Rated Voltage	AC50V, DC50V

Metal-glazed Trimmer Potentiometers

Features:

- Excellent stability and environmental resistance by utilization of a metal glazed resistor element.
- Miniature, yet with high power handling capabilities.

<p>VM5CK-PV (with Dust-proof Knob)</p> 	<p>MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p> 	<p>TM6K3-2</p> 	
<p>VM6CK-PV</p> 	 <p>MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)</p>	<p>VM6CK-PV(1S) (with Knob)</p> 	 <p>MOUNTING HOLE DIMENSIONS ON P.C.B. (REFERENCE)</p>
<p>VM6CK-PH</p> 	 <p>MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p>	<p>VM6CK-PH(1S) (with Knob)</p> 	 <p>MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p>
<p>TM64K2(PV) (with Dust-proof Knob)</p> 	 <p>MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p>	<p>TM64K2(PH) (with Dust-proof Knob)</p> 	 <p>MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p>
<p>TM8KV2-1S (with Dust-proof Knob)</p> 	<p>MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p> 	<p>TM8KH1-1S (with Dust-proof Knob)</p> 	 <p>MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p>
<p>TM10K(PV) (with Dust-proof Knob)</p> 	<p>MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p>  <p>ACJ.SLOT 0.8x4.2-1 IN DEPTH</p>	<p>TM10K(PH) (with Dust-proof Knob)</p> 	 <p>MOUNTING HOLE DIMENSIONS ON P.C.B.(REFERENCE)</p>

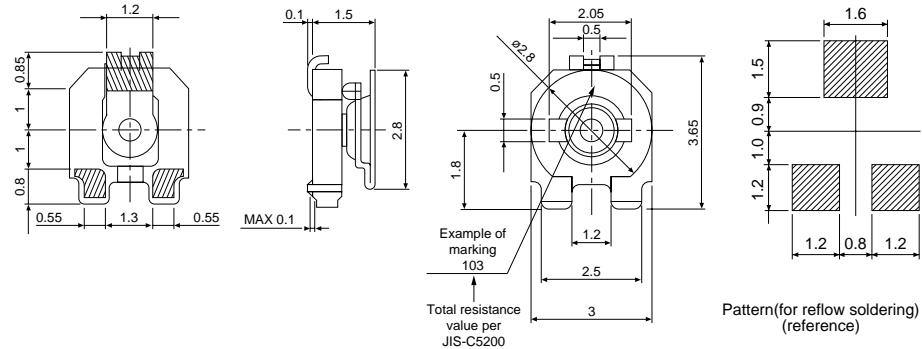
	VM5CK	VM6CK	TM6K	TM64K	TM8K	TM10K
Rotational Angle	200±20°	200±10°	230°	200±10°	260±10°	200±10°
Rotational Torque	2-20mN·m (20-204gf·cm)	3-30mN·m (31-306gf·cm)	2-15mN·m (20-153gf·cm)	3-25mN·m (31-255gf·cm)	3-30mN·m (31-306gf·cm)	3-35mN·m (31-357gf·cm)
Resistance Range	100Ω-1MΩ (taper B)	200Ω-1MΩ (taper B)	50Ω-500kΩ (taper B)	100Ω-1MΩ (taper B)	200Ω-1MΩ (taper B)	100Ω-1MΩ (taper B)
Resistance Tolerance	±25%	±20%	±30%	±20%	±20%	±20%
Rated Power	0.2W	0.3W	0.1W	0.3W	0.5W	0.5W
Maximum Rated Voltage	AC 100V, DC 100V	AC 100V, DC 100V	AC 50V, DC 50V	AC 100V, DC 100V	AC 250V, DC 250V	AC 200V, DC 200V
Temperature Coefficient	Less than 100kΩ: ±200ppm/°C 100kΩ to 1MΩ: ±300ppm/°C	±200ppm/°C (500Ω-100kΩ)	±250ppm/°C (500Ω-100kΩ)	±200ppm/°C (500Ω-100kΩ)	±200ppm/°C (200Ω-100kΩ)	±300ppm/°C
Operating Life	50 cycles	50 cycles	50 cycles	50 cycles	100 cycles	100 cycles

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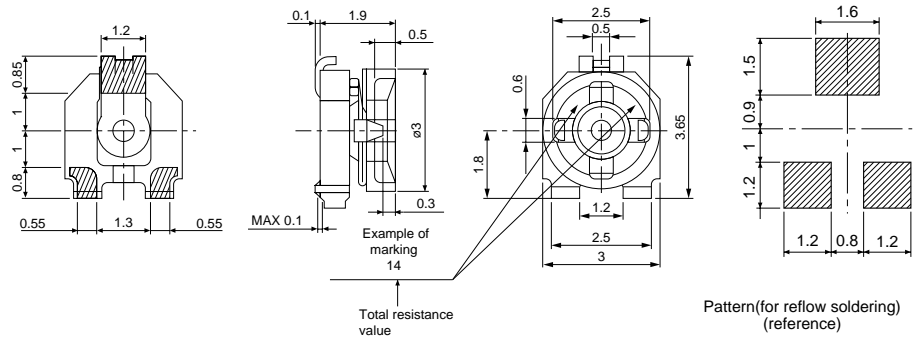
Surface Mount Trimmer Potentiometer (Metal-glazed Type)

TMC3K Series

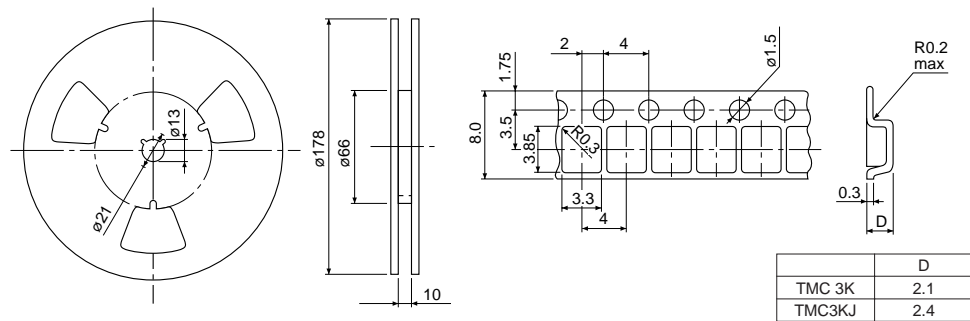
TMC3K



TMC3KJ



Taping (Holds, 2000 parts)



FEATURES

- 1.Space Saving Size
- 2.Easily adjusts with standard screwdriver.
- 3.Metal-glaze resistance element gives excellent stability and protection against environmental factors.
- 4.Can be mounted to a circuit board with adhesive.
- 5.Designed for reflow soldering.
- 6.Supplied in 8mm tape for automatic assembly equipment.


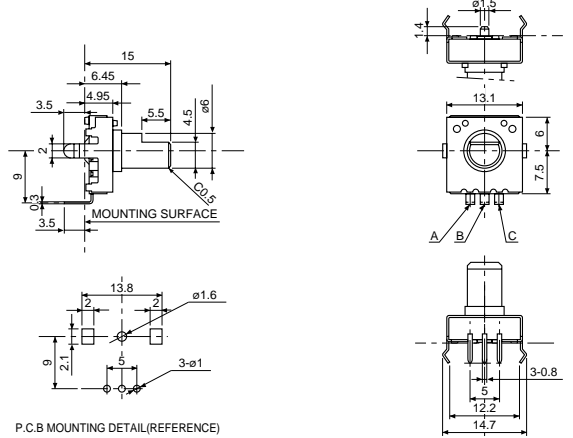
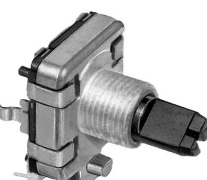
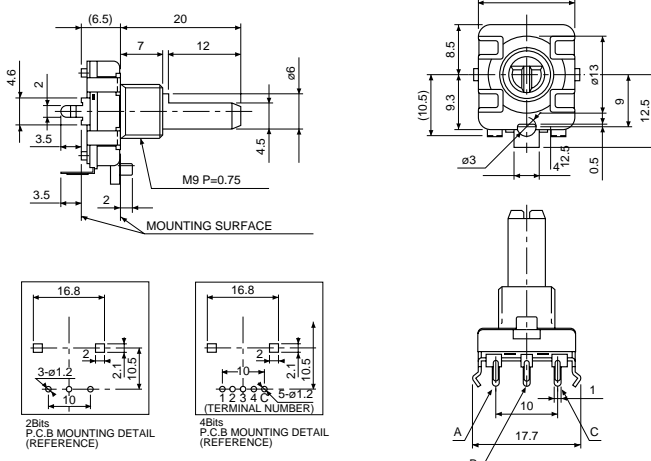
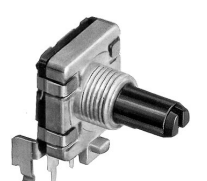
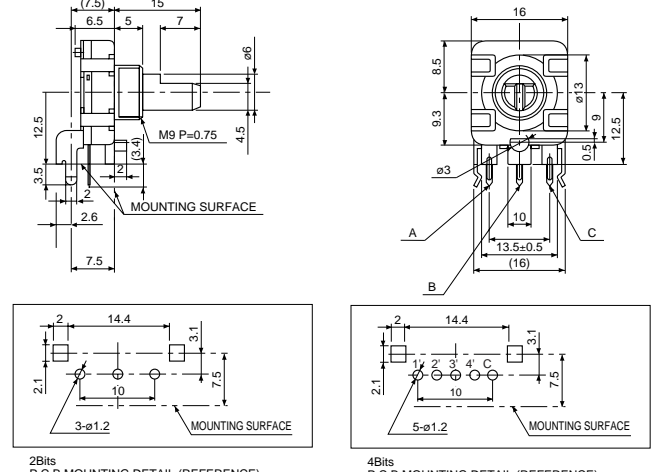
APPLICATIONS

CAMERA built-in VCR, 8mm VCR, VCR camera, still camera, headphone stereos, LCD television, disk drive, bar code equipments, rader detectors, hand held equipments.

SPECIFICATIONS

Total Rotational Angle	Endless (effective rotational angle 250 ±20°)
Rotational Torque	1~20mN·m(10.2~204gf·cm)
Nominal Total Resistance	100Ω, 220Ω, 470Ω, 1kΩ, 2.2kΩ, 4.7kΩ, 10kΩ, 22kΩ, 47kΩ, 100kΩ, 220kΩ, 470kΩ, 1MΩ, 2.2MΩ
Total Resistance	Within ±25% of the nominal total resistance
Resistance Taper	taper B(Linear)
Rated Power	0.1W
Maximum Rated Voltage	AC20V,DC20V
Resistance Temperature Coefficient	Within±250ppm/°C

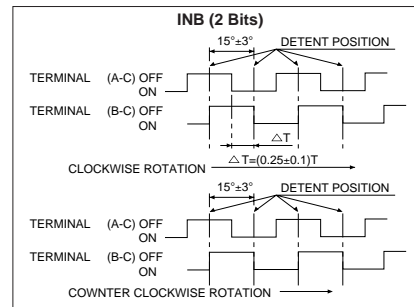
Rotary Encoders RE Series

<p>RE0131PVB (Insulated Shaft) (Bracket Type)</p> 	 <p>P.C.B MOUNTING DETAIL(REFERENCE)</p>
<p>REB161PVB (Insulated Shaft)</p> 	 <p>28bits P.C.B MOUNTING DETAIL (REFERENCE) 48bits P.C.B MOUNTING DETAIL (REFERENCE)</p>
<p>REB161PHD (Insulated Shaft)</p> 	 <p>28bits P.C.B MOUNTING DETAIL (REFERENCE) 48bits P.C.B MOUNTING DETAIL (REFERENCE)</p>

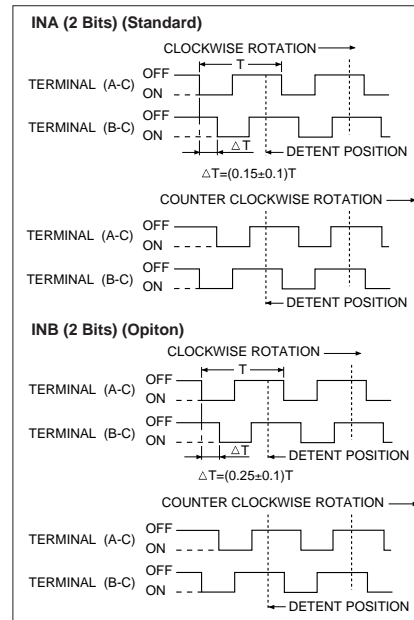
SPECIFICATIONS

	RE0131	REB161	REB161
Type of Output Signal	INB (2 Bits)	INA, INB (2 Bits)	INA, INB (2 Bits) GRY (4 Bits)
Operating Temperature Range	-10 to 70°C	-10 to 70°C	-10 to 70°C
Rated Voltage/Rated Current	DC 5V 0.5mA	DC 5V 0.5mA	DC 5V 0.5mA DC 12V 4mA
Resolution	12 Pulses/360°	24 Pulses/360°	24 Pulses/360° 4Bits 16 Pulses/360°
Total Rotational Angle	360° Endless	360° Endless	360° Endless 360° Endless
Detent Position and Angle	24 Detents 15±3°	24 Detents 15±3°	24 Detents 15±3° 16 Detents 22.5±3°
Detent Torque	1.5 to 15 mN·m	3 to 20 mN·m	3 to 20 mN·m
Rotational Life	50,000 cycles	100,000 (INA) 50,000 (INB) cycles	100,000 (INA) 50,000 (INB) cycles 50,000 (INA) cycles

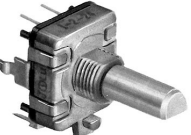
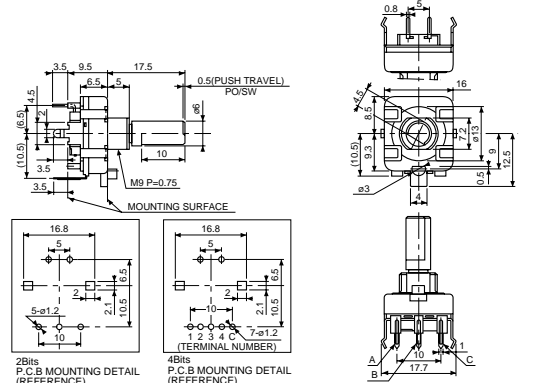

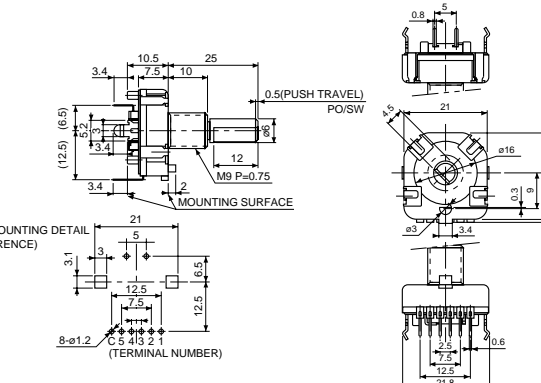

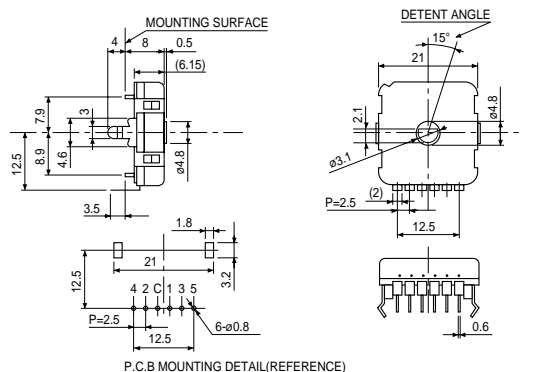
INCREMENTAL OUTPUT SIGNAL (for RE0131)



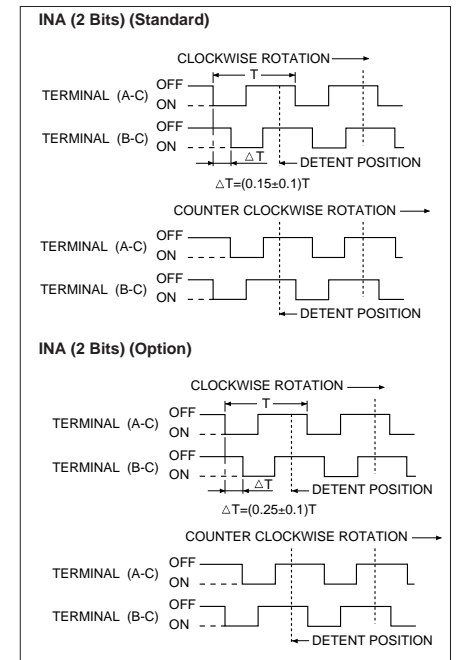
INCREMENTAL OUTPUT SIGNAL (for REB161)



Rotary Encoders RE Series

<p>REB162PVBS (With Push-Momentary Switch)</p> 	 <p>28bits P.C.B MOUNTING DETAIL (REFERENCE) 48bits P.C.B MOUNTING DETAIL (REFERENCE)</p>
<p>REB202PVBS (With Push-Momentary Switch)</p> 	 <p>P.C.B MOUNTING DETAIL (REFERENCE)</p>
<p>RE0201PVB (Shaft-less)</p> 	 <p>P.C.B MOUNTING DETAIL(REFERENCE)</p>

INCREMENTAL OUTPUT SIGNAL (For REB162)



Specification of Push-Momentary Switch (For REB162, REB202)

Circuit	SPST
Rated Voltage/Rated Current	DC 16V 20mA
Contact Resistance	100mΩ max.
Insulation Resistance	10MΩ min. at DC 100V
Withstand Voltage	AC 100V for 1 minute
Push Travel	0.5mm
Operating Force	5 ± 1.5 N
Operational Life	10,000 actuations

OUTPUT SIGNAL (Pulse Type) GRAY CODE (For REB162, RE0201, REB202)

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
Terminal Number	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○=ON

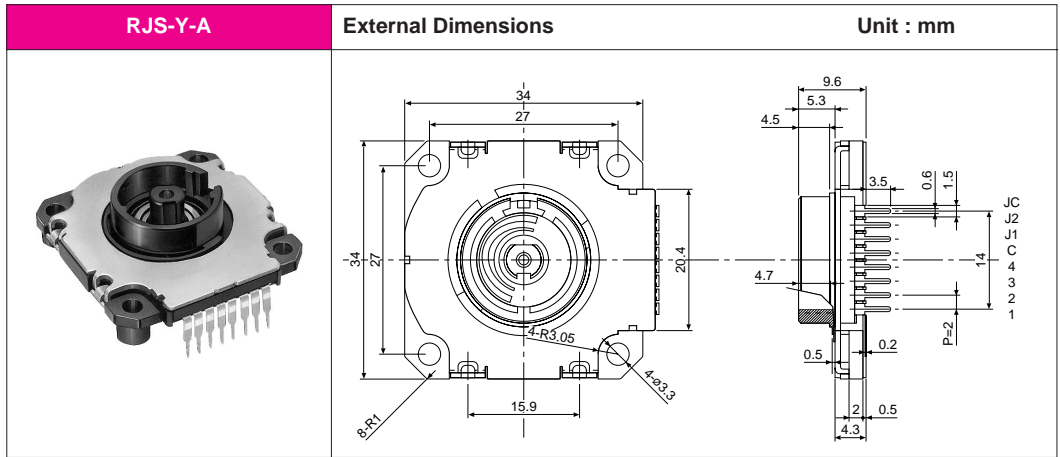
Terminal Number C=Common

*1, *2: GRAY code for REB162 and REB202 start at the position number 2.

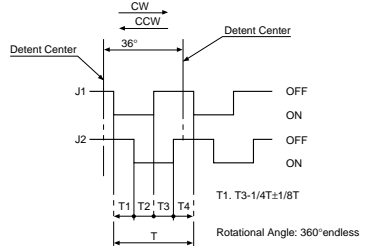
SPECIFICATIONS

	REB162	RE0201	REB202
Type of Output Signal	INA, INB (2 Bits)	GRAY *1 (4 Bits)	GRAY *2 (5 Bits)
Operating Temperature Range	-30 to 80°C	-30 to 80°C	-30 to 80°C
Rated Voltage/Rated Current	DC 5V 0.5mA	DC 12V 4mA	DC 12V 10mA
Resolution	24 Pulses/360°	15 Positions/300°	24 Positions/360°
Total Rotational Angle	360° Endless	300±5°	360° Endless
Detent Position and Angle	24 Detents 15±3°	15 Detents 21.4±5°	24 Detents 15±3°
Detent Torque	5 to 25 mN·m	5 to 25 mN·m	10 to 30 mN·m
Rotational Life	50,000 cycles	30,000 cycles	10,000 cycles

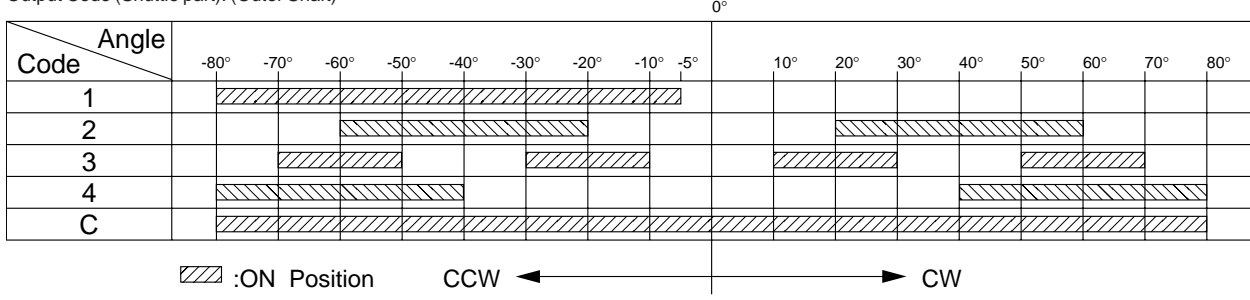
Compact Jog Shuttle Switches



Output Code (Jog part): (Inner Shaft)



Output Code (Shuttle part): (Outer Shaft)



Angle tolerance of ON area: ±3°
 Rotational Angle: 160° (80° in C.C.W and 80° in C.W direction)

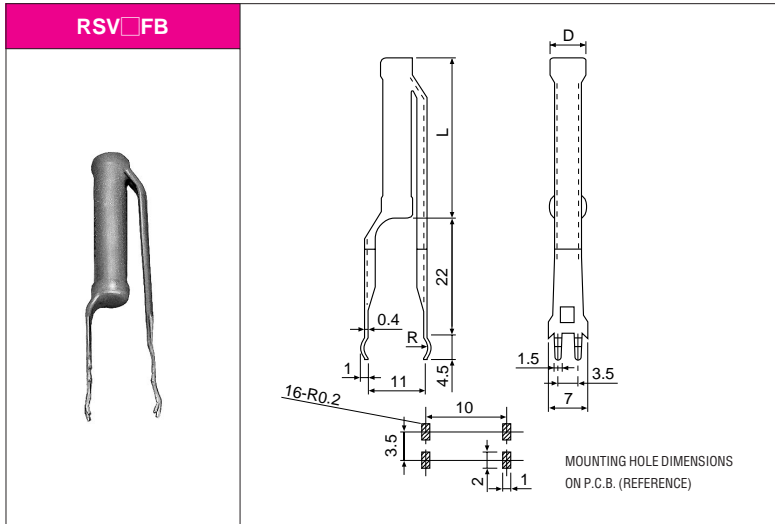
SPECIFICATIONS

	Jog Part	Shuttle Part
Operating Temperature Range		-20 to 70°C
Rated Voltage & Rated Current		DC 5V, 10mA
Total Rotational Angle	360° Endless/36±5° step	160°±80° (Center Position)
Rotational Torque	0.7 to 10mN-m	10 to 50mN-m
Rotary Shaft Stop Strength	30N	30N
Endurance (Sliding)	50,000 cycles	50,000 cycles

• Specifications in this catalog are presented basically for informative purposes.
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Metal Oxide Film Fixed Resistors

Upright/Vertical Mount/Snap-in Terminal RSVFB



FEATURES

- Upright/Vertical mount resistors equipped with self-standing, snap-in terminals have valuable board space increased greatly.
- Only 10mm terminal pitch and light weight.
- Two types of 7W and 5W are available.
- Improved elasticity of snap-in terminals and 2 legs construction at the tip of each terminal make smooth insertion possible and have self-standing stability increased.
- These resistors exhibit a low inductive component with excellent high frequency response.
- Standard resistance range is 1W~10kW. Consult us for resistance more than 10kW.
- Flame-proof coating prevent resistors from emitting smoke.
- Terminals equipped with heat dissipating fins creates a lower board temperature rise.
- Patents Pending.

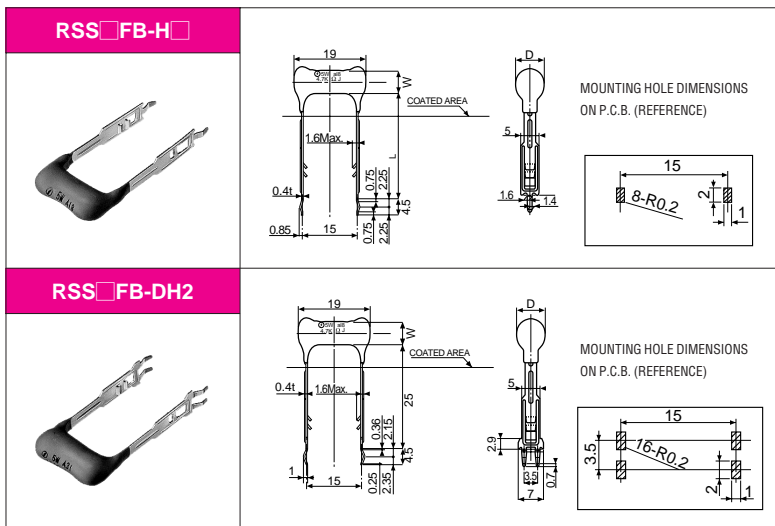
APPLICATIONS

TVs, Monitors, Printers, Switching Regulators, Power supplies, etc.

RATINGS AND DIMENSIONS

Model	Rated Power(W)	Maximum Operating Voltage (V)	Maximum Continuous Overload Voltage(V)	Maximum Intermittent Overload Voltage(V)	Resistance Range (Ω) E24 Series	Resistance Tolerance	Terminal Type	Dimensions(mm)		
								L	D	
RSV5FB	5	500	800	1500	1 to below 10 10-10K	K(±10%) J(±5%)	DH	20	8.0	Minimum order is 1,000 units. Minimum number of units per package is 50 units.
RSV7FB	7	500	800	1500	1 to below 10 10-10K	K(±10%) J(±5%)				

Vertical Mount/Snap-in Terminal RSSFB



FEATURES

- These vertical mount resistors are equipped with self-standing, snap-in terminals having many advantages:
 - (a) The surface area of the terminals has been increased which enhances their heat dissipating capacity.
 - (b) The difference in thermal conductivity between the lead material (Cu) and the snap-in terminal (Fe) creates a lower board temperature rise.
 - (c) Increased terminal strength in comparison to standard axial leaded resistors.
- Valuable board space is greatly increased.
- These resistors exhibit a low inductive component with excellent high frequency response.

RATINGS AND DIMENSIONS

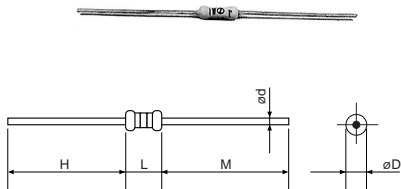
Model	Rated Power(W)	Maximum Operating Voltage (V)	Maximum Continuous Overload Voltage(V)	Maximum Intermittent Overload Voltage(V)	Resistance Range (Ω) E24 Series	Resistance Tolerance	Terminal Type	Dimensions(mm)		
								D	W	L
RSS3FB	3	500	600	750	0.22 to below 10	K(±10%)	H1 H2 DH2	7.0	7.5	H1=15
					10-100K	J(±5%)		7.0	7.5	H2=25
								7.0	7.5	H2=25
RSS5FB	5	500	800	1500	1 to below 10	K(±10%)	H1 H2 DH2	7.5	8.0	H1=15
					10-6.8K	J(±5%)		7.5	8.0	H2=25
								7.5	8.0	H2=25

RNS type (metal film type) is supplied for 3W, ratings at less than 1Ω.

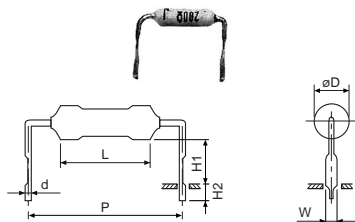
Metal Oxide Fixed Resistors

RSMFB

Straight Type

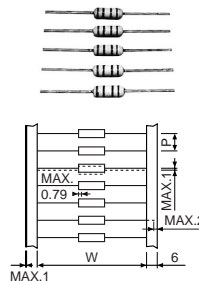


L2 Forming Finished Type



Products marked 1/2 are L-finished type.

Tape type

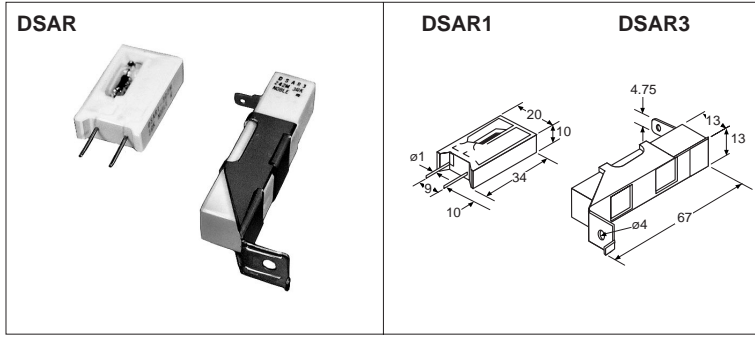


Model	Dimensions (mm)				Dimensions (mm)							Dimensions (mm)		Packaging Type TR (reel type) TB (binding type)
	L	D	d±0.02	H	L	D	d±0.02	P±1	H1±1	H2±1	W	W±1	P±0.5	
RSM1/2FB	6.4	2.3±0.5	0.6	27 min	6.4	2.3±0.5	0.6	10.0	7.0	5.5	1 min	26 or 52	5	
RSM1FB	9.0	2.8±0.5	0.8	27 min	9.0	2.8±0.5	0.8	12.5	7.0	5.5	1.25 min	52	5	
RSM2FB	12.0	4.0±1	0.8	27 min	12.0	4.0±1	0.8	15.0	7.0	5.5	1.25 min	52	5	
RSM3FB	15.0	5.5±1	0.8	38±3	15.0	5.5±1	0.8	20.0	8.0	5.5	1.25 min	63	10	

Model	Rating				Minimum Number of Units per Package				Minimum order is 1,000 units																															
	Rated Power 70°C (W)	Voltage Rating (V)	Resistance Range (Ω) (E24 series)	Resistance Tolerance	Straight Type	L2 Forning finished type (Products marked 1/2 are L-finished type)	Taped type																																	
							TB	TR																																
RSM1/2FB	0.5	250	0.2-47K	Standard ±5% (J)	100	500	2,000	3,000	<table border="1"> <thead> <tr> <th colspan="4">E24 Series Table</th> </tr> </thead> <tbody> <tr><td>10</td><td>18</td><td>33</td><td>56</td></tr> <tr><td>11</td><td>20</td><td>36</td><td>62</td></tr> <tr><td>12</td><td>22</td><td>39</td><td>68</td></tr> <tr><td>13</td><td>24</td><td>43</td><td>75</td></tr> <tr><td>15</td><td>27</td><td>47</td><td>82</td></tr> <tr><td>16</td><td>30</td><td>51</td><td>91</td></tr> </tbody> </table>				E24 Series Table				10	18	33	56	11	20	36	62	12	22	39	68	13	24	43	75	15	27	47	82	16	30	51	91
E24 Series Table																																								
10	18	33	56																																					
11	20	36	62																																					
12	22	39	68																																					
13	24	43	75																																					
15	27	47	82																																					
16	30	51	91																																					
RSM1FB	1.0	350	0.2-68K	100	500	2,000	3,000																																	
RSM2FB	2.0	350	0.2-100K	100	500	2,000	3,000																																	
RSM3FB	3.0	350	0.2-120K	100	500	1,000	1,000																																	

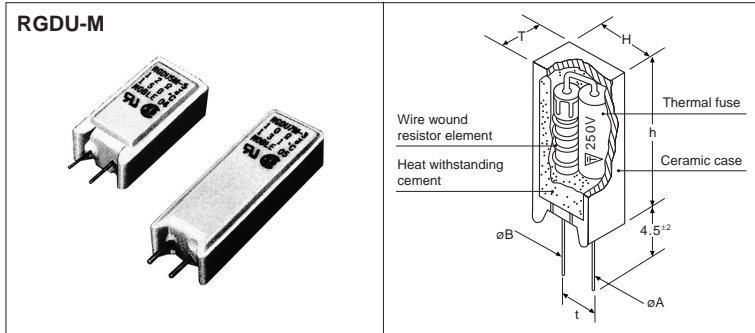
Below 10Ω will be metal film resistor our type RNM.

Surge Absorber DSAR Series



Flashover Voltage	180-3600V depending on model
Insulation Resistance	10 ⁹ Ω min.
V-t Characteristics	1μsec max. (1.2 × 50μsec waveform)
Electrostatic Capacity	1pF max.
Internal Connection	<p>DSA Discharge element RGS5 Continuous current blocking resistor</p>

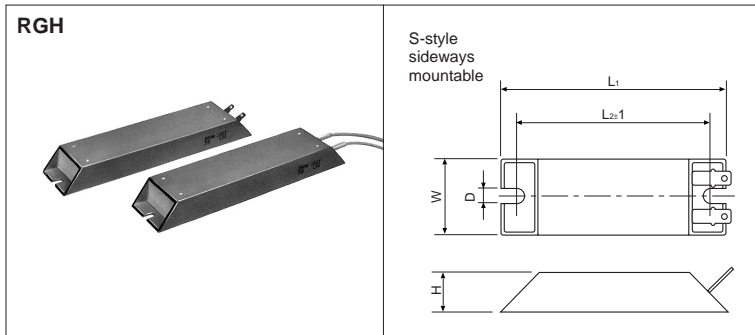
Thermal Fuse Resistor RGD-M, RGDU-M, RGD Series



Model	Rated Power (A)	Dimensions (mm)						Fusing Temperature Code	Resistance Range (Ω)
		H	T	h	t	A	B		
RGD 2M	2	12	7	21	5	0.6	0.8	0 (95°C)	0.22~ 270
RGD 3M		12	8	26	5	0.6	0.8	1 (110°C)	0.27~ 680
RGD 5M		13	9	26	5	0.6	0.8	3 (126°C)	0.27~ 680
RGD 7M		13	9	38.5	5	1.0	1.0	4 (130°C)	0.68~1200
RGD 10M		16	13	35	7.5	1.0	1.0	5 (145°C)	1.0 ~1800
RGDU 5M	2	13	9	26	5	0.6	0.8	1 (110°C)	1.0 ~ 100
RGDU 7M		13	9	38.5	5	1.0	1.0	3 (126°C)	1.0 ~ 100
								4 (130°C)	
							5 (145°C)		

10A thermal fuse is built in RGD2~RGD10.
UL Standard 1412, File No. E62418. (RGDU Types)
CSA Standard File No. LR85971-The Fusing temperatures are: 1 (115°C), 3 (131°C), 4 (135°C), 5 (150°C)

Metal-Clad Resistor RGH Series



The RGH1000 and the RGH1500 have 4 installation grooves.

All dimensions in mm.

Model	Rated Power	L ₁	L ₂	W	H	D	Weight (approximate)
RGH 60	60W	115	100	40	20	5.3	110g
RGH 80	80W	140	125	40	20	5.3	160g
RGH 100	100W	165	150	40	20	5.3	200g
RGH 120	120W	190	175	40	20	5.3	240g
RGH 150	150W	215	200	40	20	5.3	290g
RGH 200	200W	215	200	50	25	5.3	460g
RGH 250	250W	240	225	50	25	5.3	540g
RGH 300	300W	215	200	60	30	5.3	700g
RGH 400	400W	265	250	60	30	5.3	930g
RGH 500	500W	335	320	60	30	5.3	1000g
RGH1000	1000W	400	385	100	50	5.3	3300g
RGH1500	1500W	450	435	120	60	5.3	5000g

Various Types of Metal-Clad Resistor RGH

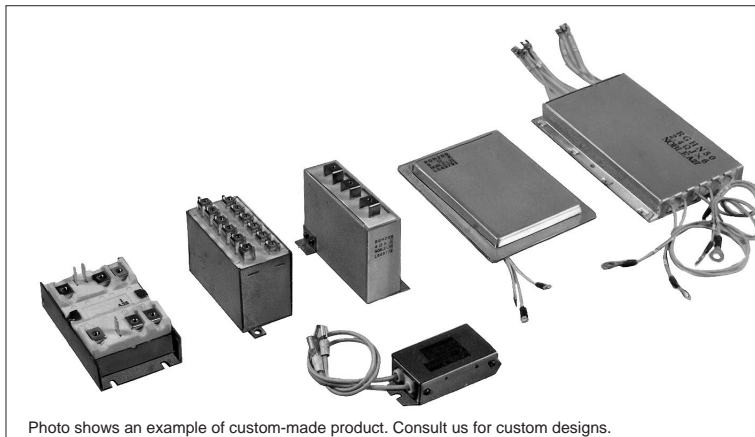
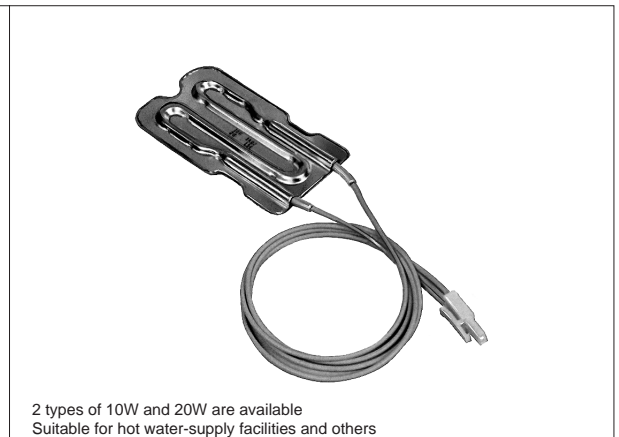



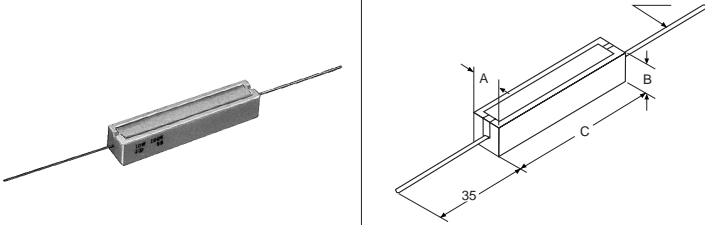
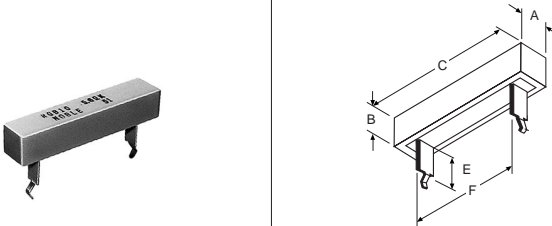
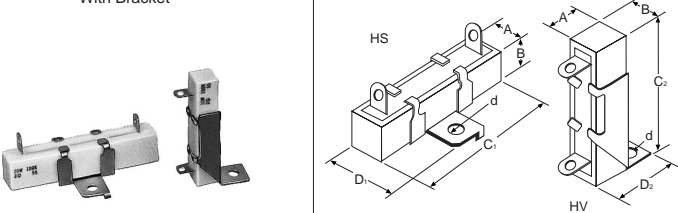
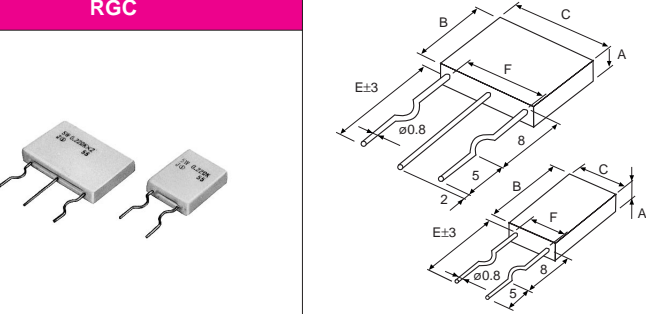
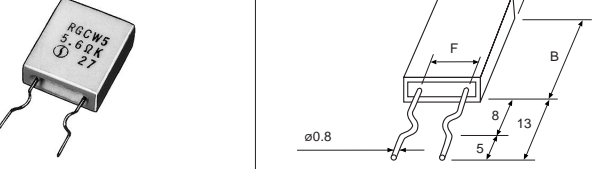
Photo shows an example of custom-made product. Consult us for custom designs.

Antifreeze-Plate Type Heaters RPH Series



2 types of 10W and 20W are available
Suitable for hot water-supply facilities and others

Cement-Filled Fixed Resistors

RGG	
RGB-L RGU-L	
RGB-PH RGU-PH	
RGB-HS, HV RGU-HS, HV	<p style="text-align: center;">With Bracket</p> 
RGC	
RGCW	

Model	Rated Power (W)	Resistance Range (Ω)	Dimensions (mm)				
			A	B	C	F	d
RGG2	2	0.22-270	11	7	21	5	0.8
RGG3	3	0.27-680	12	8	26	5	0.8
RGG5	5	0.27-680	13	9	26	5	0.8
RGG7	7	0.68-1,200	13	9	38.5	7.5	1.0
RGG10	10	1-1,800	16	13	35	7.5	1.0
RGG20	20	1.5-2,700	20	13	45	7.5	-

The RGG 20 terminal forms differ so consult us for further details.

Model	Rated Power (W)	Resistance Range (Ω)	Dimensions (mm)		
			A/B	C	d
RGB2 (RGU 2)	2	0.22-270 (56)	6.3	18	0.8
RGB3 RGU 3	3	0.27-680	8	23	0.8
RGB5 RGU 5	5	0.27-680	9.5	23	0.8
RGB7 RGU 7	7	0.68-1,200	9.5	36	0.8
RGB10 RGU10	10	1-1,800	9.5	48	0.8
RGB15 RGU15	15	1.2-2,200	13	48	1.0
RGB20 RGU20	20	1.5-2,700	13	63.5	1.0

Note: Type RGU's are the UL listed "fusing and temperature limiting resistors" (File No. E62418).

Model	Rated Power (W)	Resistance Range (Ω)	Dimensions (mm)			
			A/B	C	E	F
RGB5PH RGU5PH	5	0.27-680	9.5	23	10	10
RGB7PH RGU7PH	7	0.68-1,200	9.5	36	10	22.5
RGB10PH RGU10PH	10	1-1,800	9.5	48	10	35
RGB5P-PK-PD-PM	5	0.27-680	9.5	28	-	15
RGB7P-PK-PD-PM	7	0.68-1,200	9.5	36	-	22.5
RGB10P-PK-PD-PM	10	1-1,800	9.5	48	-	35
RGB15PK-PD-PM	15	1.2-2,200	13	48	-	33
RGB20PK-PD-PM	20	1.5-2,700	13	63.5	-	49

(PH... Standard type) (P... straight type) (PK... Taller type) Self-standing snap-in terminals. (PD... Taller and Double-pins type) (PM... wider-pins type) Self-standing snap-in terminals. Refer to individual catalogue No. 3 for details. Type RGU are UL-Listed fusing and temperature limiting resistors (under file No. E62418)

Model	Rated Power (W)	Resistance Range (Ω)	Dimensions (mm)					
			A/B	C ₁	C ₂	D ₁	D ₂	ød
RGB10H RGU10H	10	1-1,800	9.5	48	48	25	23.5	4
RGB15H RGU15H	15	1.2-2,200	13	48	57	28.5	27	4
RGB20H RGU20H	20	1.5-2,700	13	63.5	63.5	28.5	27	4
RGB30H RGU30H	30	1.8-3,300	19	75	83	38	36	4.2
RGB40H RGU40H	40	2.2-4,700	19	90	90	38	36	4.2

Type RGU are UL-listed fusing and temperature limiting resistors (under file No. E62418).

HS is equipped with a horizontal mounting bracket, and HV with a vertical mounting bracket. Designate F or FD instead of H for Fast-on or Current/Voltage (4) terminals.

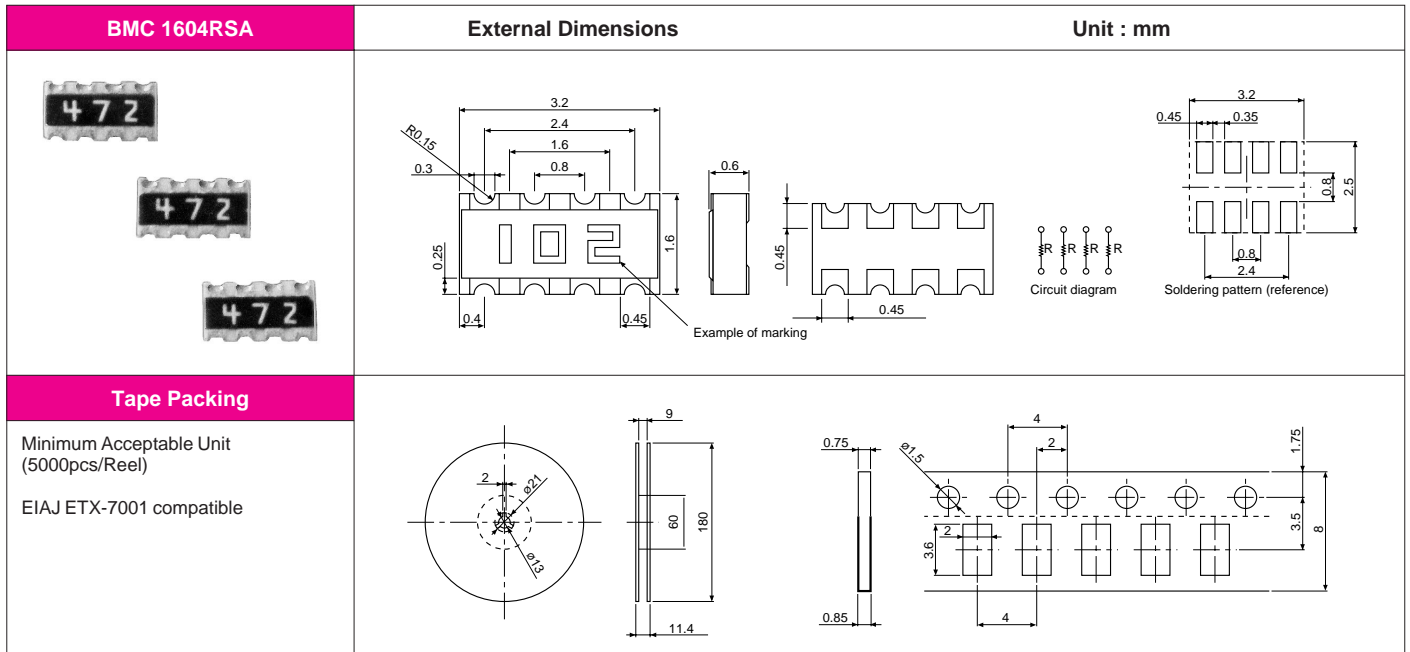
Model	Rated Power (W)	Resistance Range (Ω)	Dimensions (mm)						Element count
			A	B	C	E	F		
RGC2	2	0.1-1	5	9	14	13	9	Single	
RGC3	3	0.1-1	5	13	14	13	9		
RGC5	5	0.1-1	5	17	14	13	9		
RGC22	2+2	0.1-1	5	9	26	13	18	Twin	
RGC33	3+3	0.1-1	5	13	26	13	18		
RGC55	5+5	0.1-1	5	17	26	13	18		
RGC771	7+7	0.1-0.39	5	20	26	13	18		

Twin-type has two elements at very close resistance values and the same TCR, and is best suited for the final-stage emitters resistor of a stereo power amplifier.

Model	Rated Power (W)	Resistance Range (Ω)	Dimensions (mm)			
			A	B	C	F
RGCW2	2	1-51	6	10	15	9
RGCW3	3	1-51	6	13	15	9
RGCW5	5	1-100	6	18	15	9

• Specifications in this catalog are presented basically for informative purposes. We request the exchange of official approval drawings before placing order.

Fixed Chip Resistor Network (4 element)



FEATURES

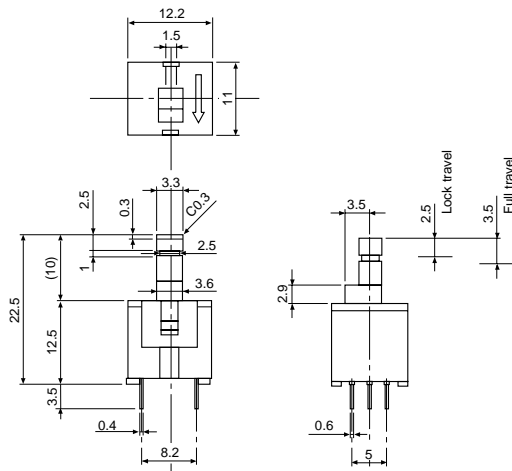
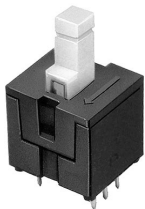
- Four independent resistor elements in a single package reduces placement costs and set-up time.
- Available in tape and reel or bulk case(patentpending) packaging for high-speed pick-and-place equipment.
- Metal-glaze resistors in the elements provide excellent stability and temperature coefficient.

Operating Temperature Range	-55 to 125°C
Rated Power	1/16W / Element at 70°C
Maximum Operating Voltage	DC 50V
Resistance Range	10Ω to 1MΩ (E6 Series)
Resistance Tolerance	J(±5%)
Resistance Temperature Characteristics	±200ppm/°C

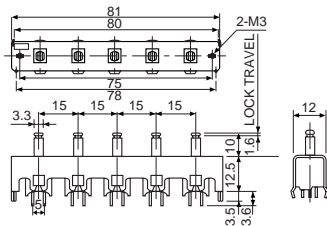
- Specifications in this catalog are presented basically for informative purposes.
We request the exchange of official approval drawings before placing order.

Push Switch SF12 Series

SF123



SF1212-05



Operating Travel	Lock travel : 2.5±0.3mm Full travel : 3.5±0.3mm
Operating Force	3.43±1.18N(350±120gf)
Circuit	DPDT
Rating	DC 12V 3A
Contact Resistance	30mΩ max.
Operating Temperature Range	-30-85°C

Consult in advance with Noble about rush current.

Operating Travel	Lock travel : 1.6±0.3mm Full travel : 2.5±0.3mm
Operating Force	2.5±1N(255±102gf)
Circuit	2-circuit, 2-position/1-key
Rating	30VDC, 0.3A
Contact Resistance	30mΩ max.
Operating Temperature Range	-30-80°C

Long travel type SF122 at 2.5mm lock travel / 3.5mm full travel also available.

MR Sensors (TDM Series)

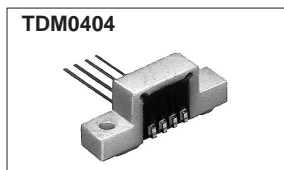
Magneto-Resistance Device
High-Sensitivity in Weak Magnetic Fields and
High-Speed Response Capability are Offered Together

FEATURES

- Compact and light weight.
- Ferromagnetic thin films made from a permalloy or a nickel-cobalt alloy as an element
 - High sensitivity in a weak magnetic field like 8KA/m{100 Oe}
 - Higher response speed and higher resolution than the methods with a coil or a ray
 - By virtue of its directional sensitivity, adverse influences of leaked magnetic fields are to be alleviated
- No mechanical wear due to non-contact type
- Low power consumption

APPLICATIONS

Capstan motors for VCR, Camcorder and DAT, Servo motors for Copier and Printer, Motors for NC machine, etc.



SPECIFICATIONS

Operating Temperature Range	-30~80 °C
Rated Voltage	DC 5V (Max Operating Voltage DC12V)
Input Resistance	1,000 Ω ± 30%
Magneto-resistance Variation (Magnetic Sensitivity)	2% min. at a magnetic field intensity of 8KA/m (100 Oe)
Neutral Point Voltage	2,500 ± 30mV When 5V DC applied across input terminals

OUTLINE DRAWING TDM0404

Holder and Terminals to be led out are custom designs.

CIRCUIT DIAGRAM and WAVEFORMS

Noncontact Potentiometers (TAM Series) TAM-R3006 Long life and Low torque

TAM-R3006

FEATURES

- No rotational noise.
- Suitable to detect small rotation angle.
 - Resolution is infinity.
 - Superior linearity.
- Compared with semiconductor magneto-resistance device.
 - ① 2 times output per rotational angle.
 - ② Better temperature characteristics.

APPLICATIONS

Thickness detector, Valve angle detector, Other devices to detect angles, Liquid level detector, others.

SPECIFICATIONS

Operating Temperature Range	-30~85°C
Rated Voltage	DC6V
Output Voltage	Vp-p=2.6 ~ 3.4 through 180° rotation under condition of Vin=6V
Linearity	Within±3% in range of θ±15°. In comparison with the tangent at the electrical neutral point.
Total Rotational Angle	360° Endless
Rotational Torque	Less than 0.002N·m(20.4gf·cm)(at 25°C)
Rotational Life	Not less than 10,000,000 cycles.

