

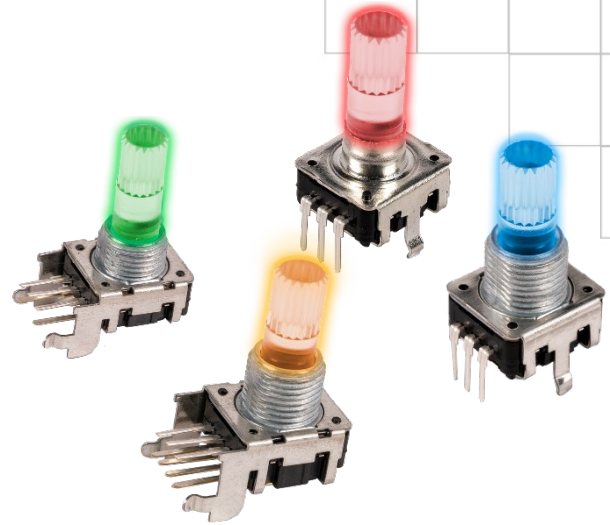
Series 12CE

12mm Rotary Encoder w/Illuminated Shaft

- Compact 12mm package size
- Single, dual and tri-color LED backlit shaft
- Rotational life (30,000 cycles)
- Switch life (20,000 actuations)
- Variety of standard resolutions and detent options

Applications

- Consumer portable electronics
- Commercial appliances
- Instrument amplifiers and guitar effects
- Keyboards and synthesizers
- Communications equipment



Ordering Information

| Series | LED Option | Terminal Configuration | Shaft Length | Shaft Trim | Resolution | LED Color | Detent Option |
|--------|------------|------------------------|--------------|------------|------------|-----------|---------------|
| 12CE | 3 | H | 20 | B | 12 | T | N |

| Code | Spec. |
|------|--|
| H | Vertical/Rear Mount Thread Bushing, PC Pins |
| K | Vertical/Rear Mount Sleeve Bushing, PC Pins |
| N | Horizontal/Side Mount Sleeve Bushing, PC Pins, 10mm Height |
| Y | Horizontal/Side Mount Thread Bushing, PC Pins 10mm Height |

| Code | Spec.* |
|------|---------|
| 1 | 15 mm |
| 2 | 16 mm |
| 3 | 17.5 mm |
| 4 | 18.5 mm |
| 5 | 20 mm |
| 6 | 21 mm |
| 7 | 24 mm |
| 8 | 25 mm |
| 9 | 26 mm |

| Code | Spec. |
|------|-----------------------|
| B | Knurled (18 teeth) |
| F | Flatted |

| Code | Spec. |
|------|--------|
| 12 | 12 PPR |
| 24 | 24 PPR |

| Code | Spec. |
|------|----------------|
| 1 | Red |
| 2 | Blue |
| 3 | Orange |
| 4 | White |
| 5 | Green |
| A | Blue/Orange |
| B | Green/Red |
| C | Blue/Green |
| D | Green/Orange |
| E | Blue/Red |
| T | Red/Green/Blue |

| Code | Spec. |
|------|--------------|
| N | No Detents |
| 12 | 12 Detents* |
| 24 | 24 Detents** |

**Available w/12 PPR only*
***Available w/12 & 24 PPR*

* See shaft length and trim options (LM) for availability by shaft trim.



Encoder Specifications

| | | Min | Typical | Max | Unit |
|--------------------------|--|-----|---------|-----|------|
| Voltage Rating | @ 0.5 mA | – | +5.0 | – | VDC |
| Output | 2-bit quadrature | | | | |
| Insulation Resistance | 100 MΩ min. @ 250 VDC | | | | |
| Dielectric Strength | 300 VAC for 1 min., no arcing | | | | |
| Resolution | 12 or 24 PPR (pulses per revolution) | | | | |
| Contact Bounce/Chatter | (See Fig. 1) | | | | |
| t1, t3 | ≤ 3 ms | | | | |
| t2 | ≤ 2 ms | | | | |
| Phase Difference | (See Fig. 2) | | | | |
| 12 PPR | ΔT ≥ 4 ms (A leads B by 90° in the CW direction) | | | | |
| 24 PPR | ΔT ≥ 3.5 ms (A leads B by 90° in the CW direction) | | | | |
| Total Mechanical Travel | 360° continuous | | | | |
| Operating Torque | 50 gf-cm (non-detent option only) | | | | |
| Detent Position | | | | | |
| 12 detents | 30° ± 3° | | | | |
| 24 detents | 15° ± 3° | | | | |
| Detent Torque | 30 to 200 gf-cm | | | | |
| Detent Position Play | 4° max. | | | | |
| Shaft Wobble | 1.0 x L/30mm p-p max.; L = Shaft Length | | | | |
| Shaft Push-Pull Strength | 5 kgf for 10 sec. | | | | |
| Shaft Static Side Load | 2 kgf max. | | | | |
| Terminal Strength | 300 gf max. | | | | |
| Rotational Life | 30,000 cycles @ 600 to 1,000 cycles/hr. | | | | |

Switch Specifications

| | | Min | Typical | Max | Unit |
|-----------------------|-------------------------------|-----|---------|-----|------|
| Voltage Rating | @ 10 mA | – | +5.0 | – | VDC |
| Contact Resistance | 100 mΩ max. | | | | |
| Contact Arrangement | SPST Momentary | | | | |
| Chatter | 10 ms max. | | | | |
| Switch Travel | 0.5mm +0 mm / -0.3mm | | | | |
| Actuation Force | 450 gf ± 200 gf | | | | |
| Insulation Resistance | 100 MΩ min. @ 250 VDC | | | | |
| Dielectric Strength | 300 VAC for 1 min., no arcing | | | | |
| Operating Life | 20,000 actuations | | | | |
| IP Rating | 40 | | | | |
| Packaging | Tray | | | | |
| Weight | 3.7 grams | | | | |

Environmental

| | | Min | Typical | Max | Unit |
|----------------------------|---|-----|---------|-----|------|
| Operating Temperature | | -10 | – | +70 | °C |
| Storage Temperature | | -30 | – | +70 | °C |
| Soldering Conditions | | | | | |
| Wave Solder | Preheat: 100°C max for 2 min max; Solder temperature: 260°C ± 5°C for 5 sec max.; | | | | |
| | No clean foam flux recommended | | | | |
| Manual Solder | 350°C ± 5°C for 3 sec max.; Sn95Ag5 no clean solder | | | | |
| Wash | Not recommended | | | | |
| Moisture Sensitivity Level | 1 | | | | |
| ESD Classification (HBM) | Not applicable | | | | |

All testing is performed at room ambient conditions except as noted. Users should verify device actual performance in their specific applications
This product is compliant to RoHS3 Directive 2015/863 Amendments of Annex II on 31 March 2015, and REACH SVHC Directive EC 1907/2006 Amendments of Annex XIV & Annex XVII on 15 January 2018.

Custom and value-added options available on request. Please contact your sales representative for additional information.

Electrical Specifications

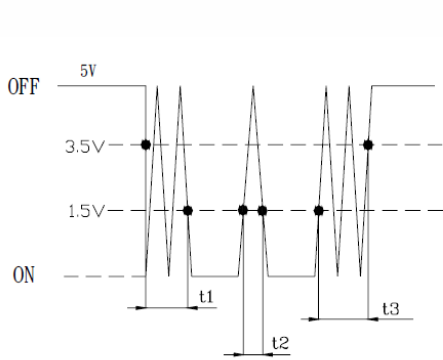


Figure 1: Contact Bounce/Chatter

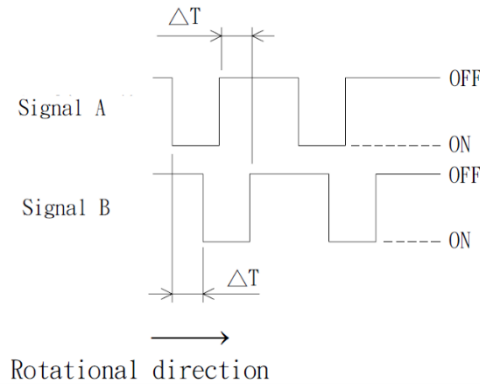


Figure 2: Phase Difference

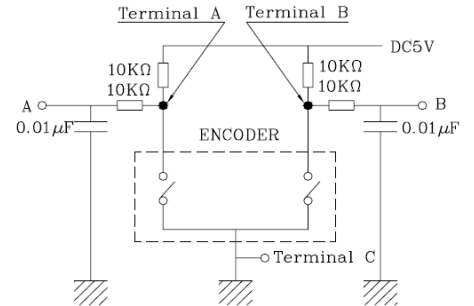
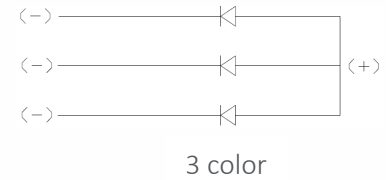
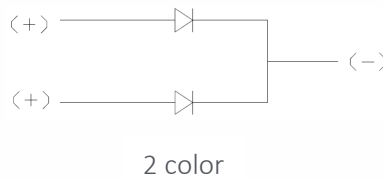


Figure 3: Suggested Filter Circuit

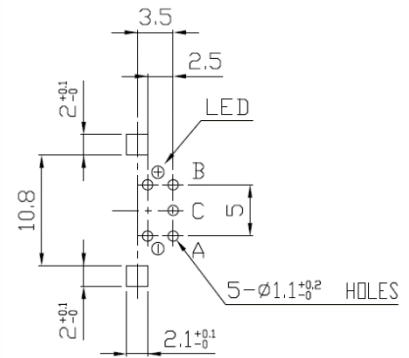
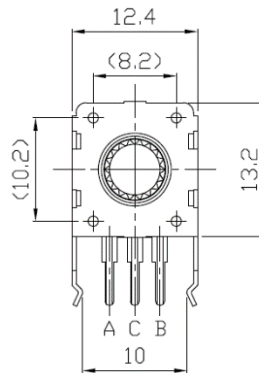
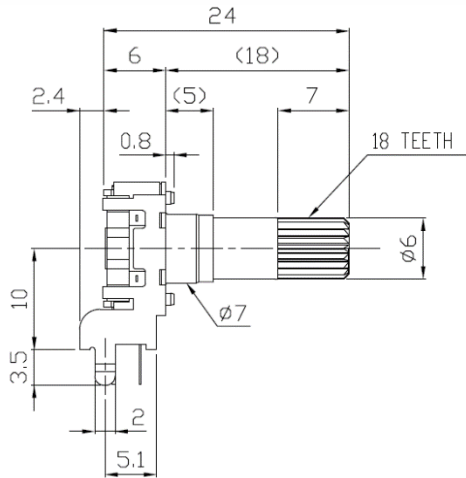
LED Specifications



| Emitted Color | Power Dissipation (mW) | DC Forward Current (mA) | Test Condition IF = 20 mA | | |
|----------------|------------------------|-------------------------|---------------------------|---------|---------|
| | | | Forward Voltage (V) | | |
| | | | Minimum | Typical | Maximum |
| Red | 60 | 30 | — | 1.8 | 2.6 |
| Blue | 72 | 20 | — | 3.2 | 3.6 |
| Orange | 100 | 30 | — | 2.1 | 2.6 |
| White | 72 | 20 | — | 3.2 | 3.6 |
| Green | 72 | 20 | — | 3.2 | 3.6 |
| Blue/Orange | Blue | 20 | 2.7 | 3.3 | 3.7 |
| | Orange | 25 | 1.7 | 2.0 | 2.4 |
| Green/Red | Green | 25 | 2.7 | 3.3 | 3.7 |
| | Red | 25 | 1.7 | 2.0 | 2.4 |
| Blue/Green | Blue | 20 | 2.7 | 3.3 | 3.7 |
| | Green | 25 | 2.7 | 3.3 | 3.7 |
| Green/Orange | Green | 25 | 2.7 | 3.3 | 3.7 |
| | Orange | 25 | 1.7 | 2.0 | 2.4 |
| Blue/Red | Blue | 20 | 2.7 | — | 3.3 |
| | Red | 25 | 1.7 | — | 2.4 |
| Red/Green/Blue | Red | 25 | 1.7 | 2.0 | 2.4 |
| | Blue | 25 | 2.7 | 3.3 | 3.7 |

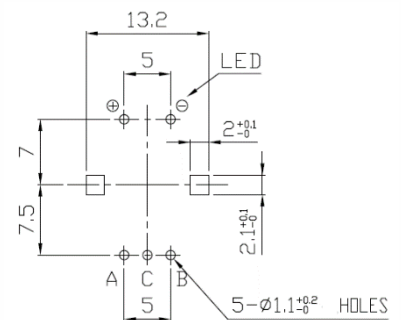
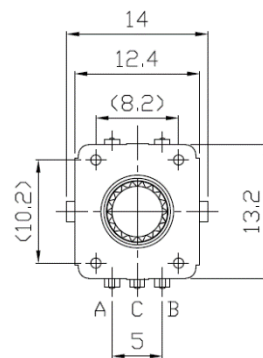
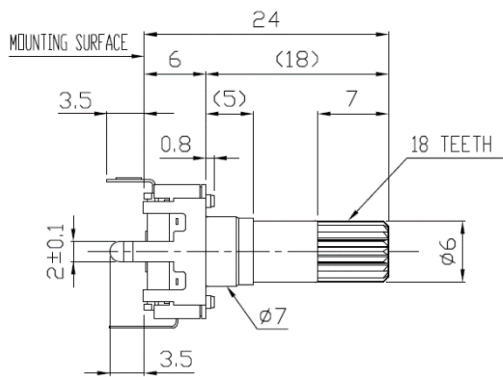
Mechanical Specifications

Series 12CE Horizontal/Side Mount with Sleeve Bushing and 1-Color LED

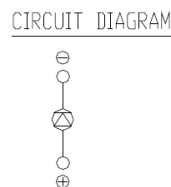
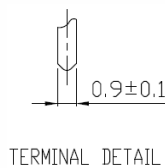


P.C.B. MOUNTING DETAIL
(TOLERANCE±0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B) t=1.6mm

Series 12CE Vertical/Rear Mount with Sleeve Bushing and 1-Color LED



P.C.B. MOUNTING DETAIL
(TOLERANCE±0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B) t=1.6mm

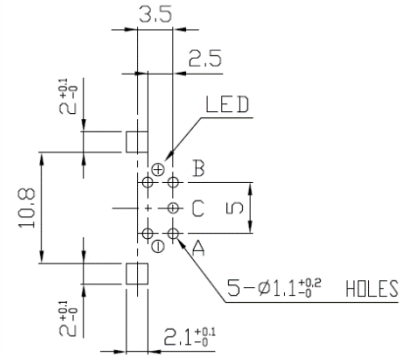
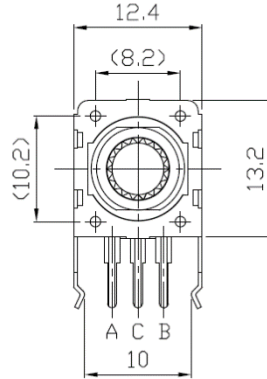
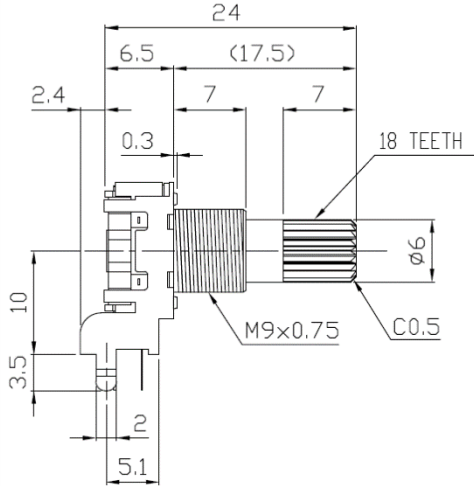


| TOLERANCES UNLESS OTHERWISE SPEC. | |
|-----------------------------------|---------------|
| $L \leq 10$ | ± 0.3 |
| $10 < L \leq 100$ | ± 0.5 |
| $100 < L$ | ± 0.8 |
| ANGULAR DIMENSION | $\pm 5^\circ$ |

Unit: mm

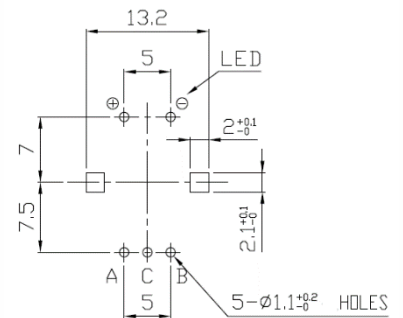
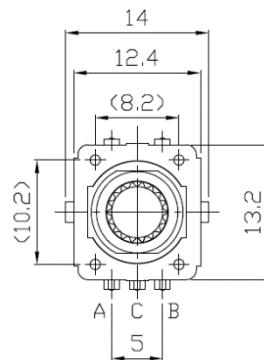
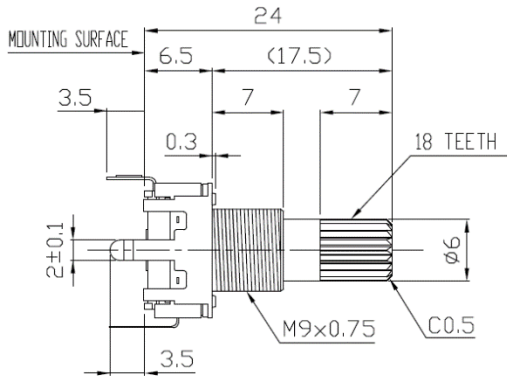
Mechanical Specifications

Series 12CE Horizontal/Side Mount with Threaded Bushing and 1-Color LED

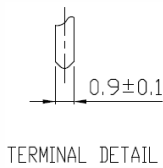


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(P.C.B) t=1.6mm

Series 12CE Vertical/Rear Mount with Threaded Bushing and 1-Color LED



P.C.B. MOUNTING DETAIL
(TOLERANCE±0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B) t=1.6mm



CIRCUIT DIAGRAM

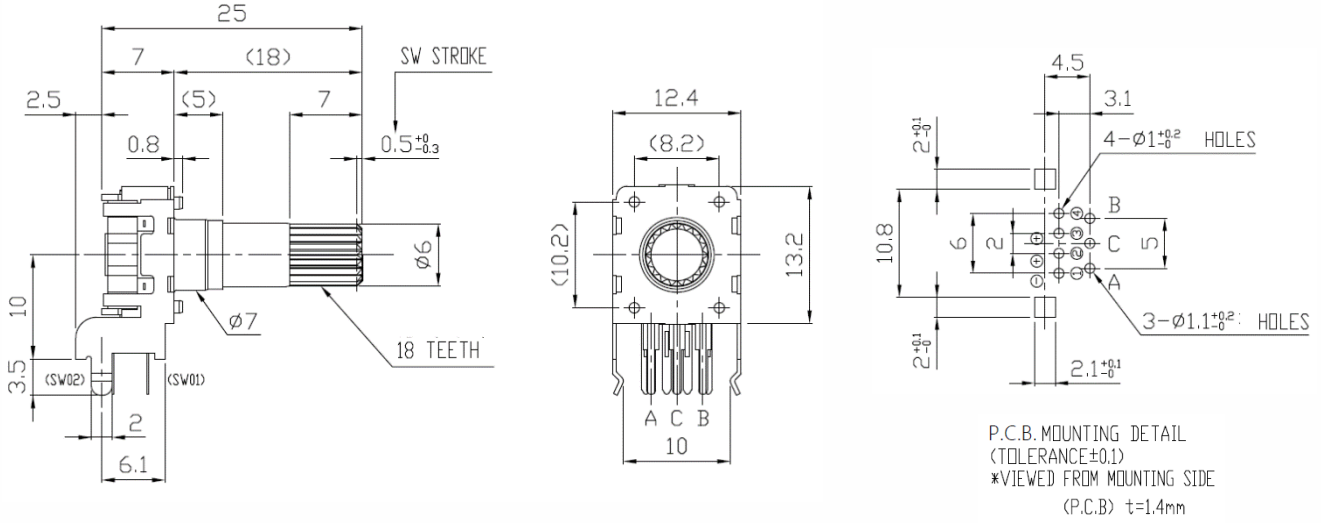


| TOLERANCES UNLESS OTHERWISE SPEC | |
|----------------------------------|------|
| $L \leq 10$ | ±0.3 |
| $10 < L \leq 100$ | ±0.5 |
| $100 < L$ | ±0.8 |
| ANGULAR DIMENSION | ±5° |

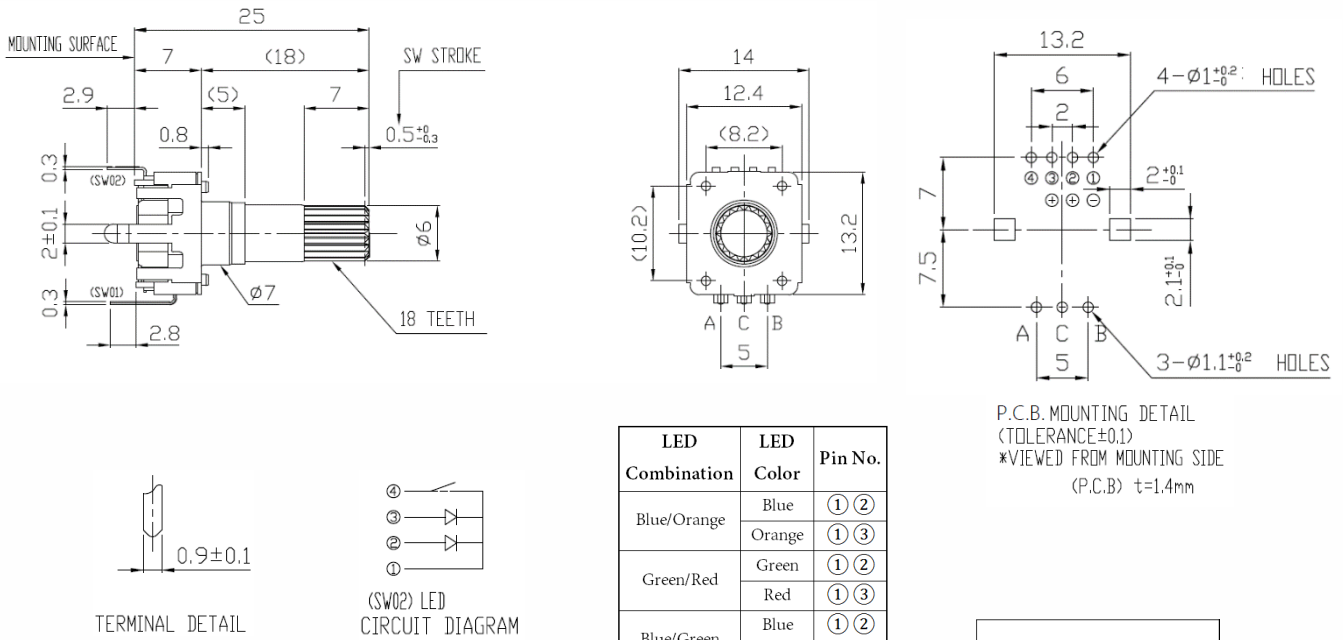
Unit: mm

Mechanical Specifications

Series 12CE Horizontal/Side Mount with Sleeve Bushing and 2-Color LED



Series 12CE Vertical/Rear Mount with Sleeve Bushing and 2-Color LED



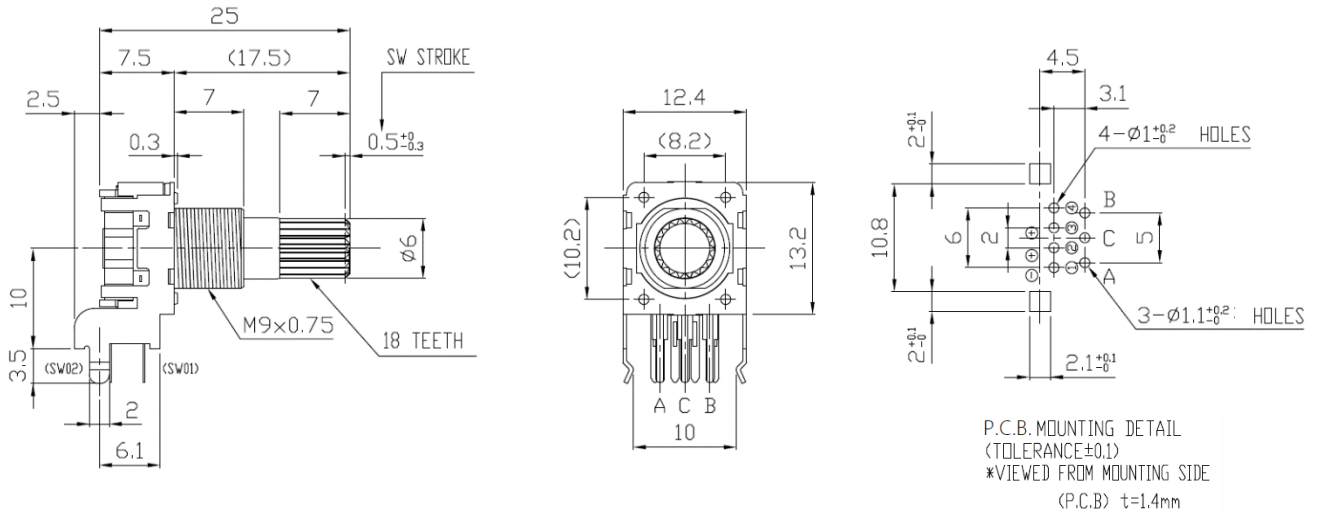
| LED Combination | LED Color | Pin No. |
|-----------------|-----------|---------|
| Blue/Orange | Blue | ① ② |
| | Orange | ① ③ |
| Green/Red | Green | ① ② |
| | Red | ① ③ |
| Blue/Green | Blue | ① ② |
| | Green | ① ③ |
| Green/Orange | Green | ① ② |
| | Orange | ① ③ |
| Blue/Red | Blue | ① ② |
| | Red | ① ③ |

| TOLERANCES UNLESS OTHERWISE SPEC | |
|----------------------------------|------|
| L ≤ 10 | ±0.3 |
| 10 < L ≤ 100 | ±0.5 |
| 100 < L | ±0.8 |
| ANGULAR DIMENSION | ±5° |

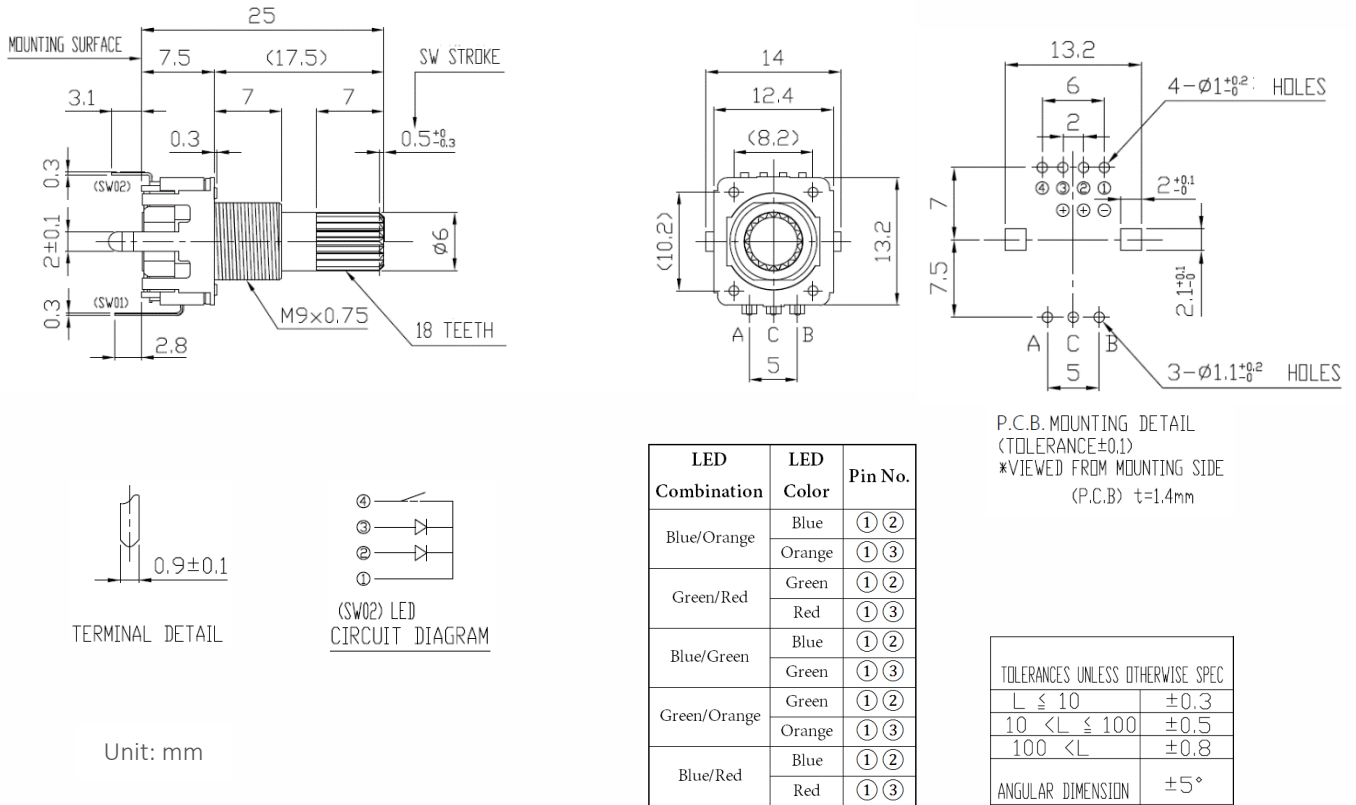
Unit: mm

Mechanical Specifications

Series 12CE Horizontal/Side Mount with Threaded Bushing and 2-Color LED



Series 12CE Vertical/Rear Mount with Threaded Bushing and 2-Color LED

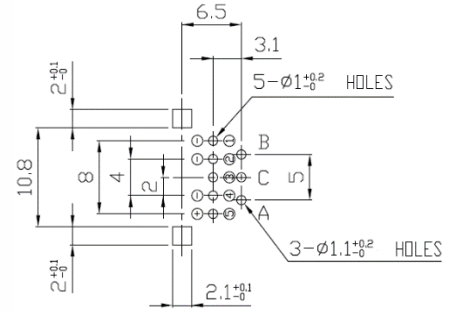
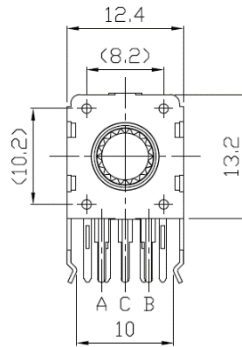
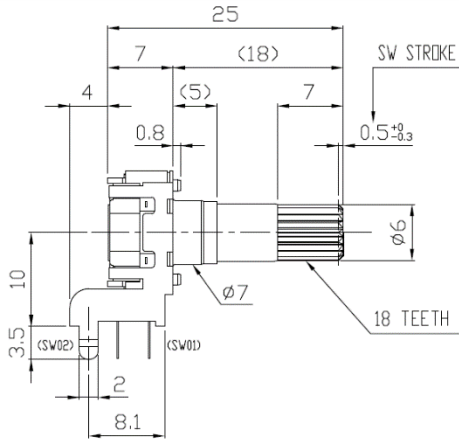


| LED Combination | LED Color | Pin No. |
|-----------------|-----------|---------|
| Blue/Orange | Blue | ① ② |
| | Orange | ① ③ |
| Green/Red | Green | ① ② |
| | Red | ① ③ |
| Blue/Green | Blue | ① ② |
| | Green | ① ③ |
| Green/Orange | Green | ① ② |
| | Orange | ① ③ |
| Blue/Red | Blue | ① ② |
| | Red | ① ③ |

| TOLERANCES UNLESS OTHERWISE SPEC | |
|----------------------------------|------|
| L ≤ 10 | ±0.3 |
| 10 < L ≤ 100 | ±0.5 |
| 100 < L | ±0.8 |
| ANGULAR DIMENSION | ±5° |

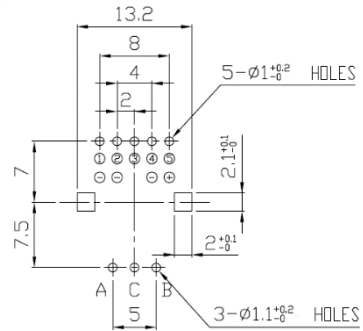
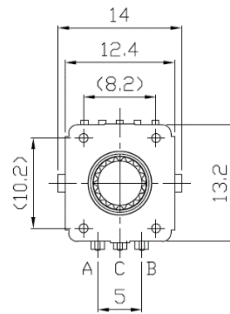
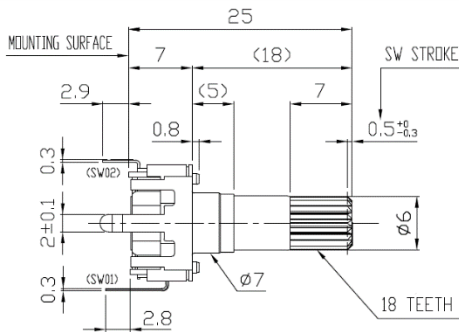
Mechanical Specifications

Series 12CE Horizontal/Side Mount with Sleeve Bushing and 3-Color LED

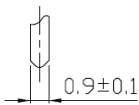


P.C.B. MOUNTING DETAIL
(TOLERANCE±0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B) t=1.6mm

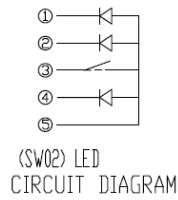
Series 12VR Vertical/Rear Mount with Sleeve Bushing and 3-Color LED



P.C.B. MOUNTING DETAIL
(TOLERANCE±0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B) t=1.6mm



TERMINAL DETAIL



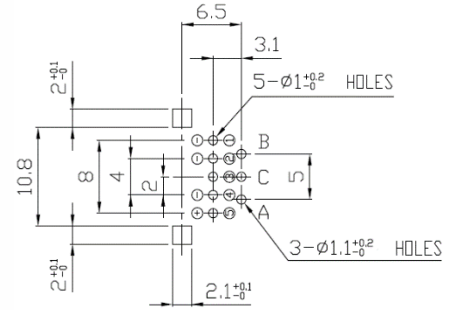
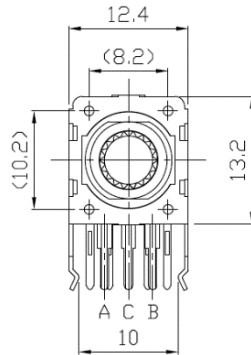
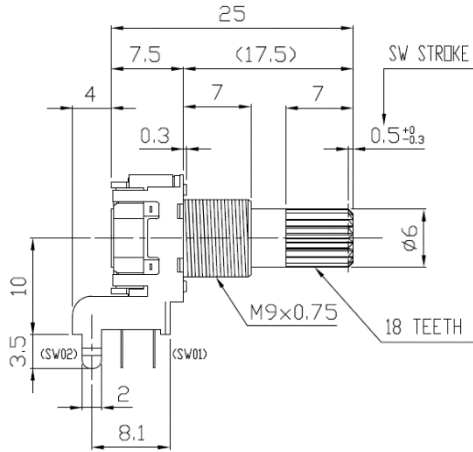
Unit: mm

| LED Combination | LED Color | Pin No. |
|-----------------|-----------|---------|
| Red/Green/Blue | Red | ① ⑤ |
| | Green | ② ⑤ |
| | Blue | ④ ⑤ |

| TOLERANCES UNLESS OTHERWISE SPEC. | |
|-----------------------------------|------|
| L ≤ 10 | ±0.3 |
| 10 < L ≤ 100 | ±0.5 |
| 100 < L | ±0.8 |
| ANGULAR DIMENSION | ±5° |

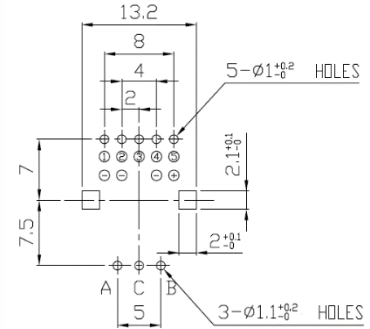
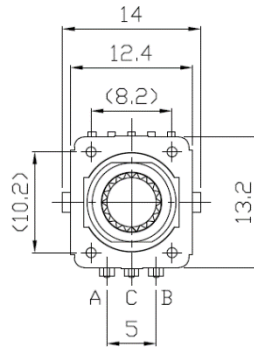
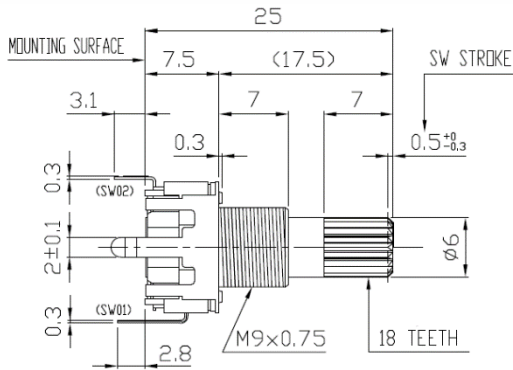
Mechanical Specifications

Series 12CE Horizontal/Side Mount with Threaded Bushing and 3-Color LED

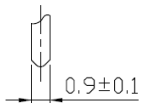


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(TOLERANCE±0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B) t=1.6mm

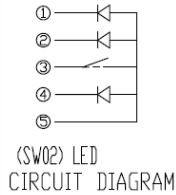
Series 12VR Vertical/Rear Mount with Threaded Bushing and 3-Color LED



P.C.B. MOUNTING DETAIL
(TOLERANCE±0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B) t=1.6mm



TERMINAL DETAIL



(SW02) LED
CIRCUIT DIAGRAM

| LED Combination | LED Color | Pin No. |
|-----------------|-----------|---------|
| Red/Green/Blue | Red | ① ⑤ |
| | Green | ② ⑤ |
| | Blue | ④ ⑤ |

| TOLERANCES UNLESS OTHERWISE SPEC | |
|----------------------------------|------|
| L ≤ 10 | ±0.3 |
| 10 < L ≤ 100 | ±0.5 |
| 100 < L | ±0.8 |
| ANGULAR DIMENSION | ±5° |

Unit: mm