

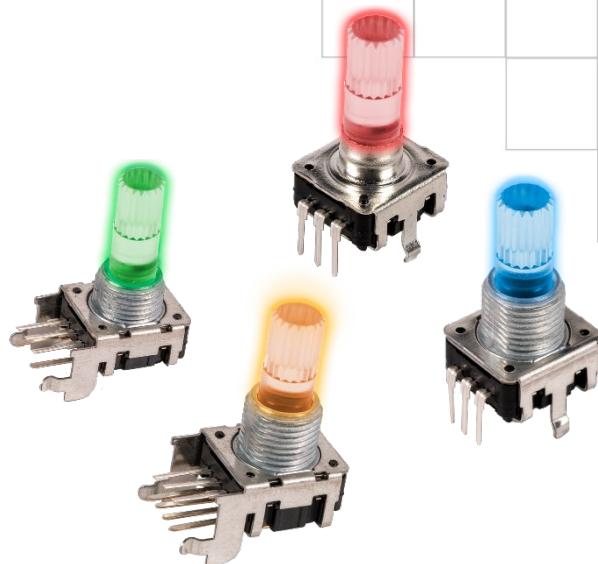
Series 12CE

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

ZUZU-UD-1 / Rev. A

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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

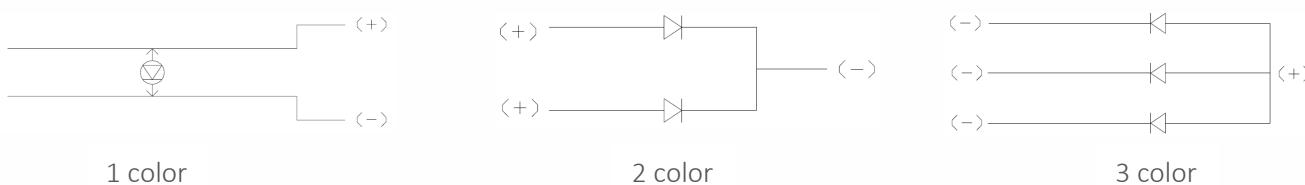
		Min	Typical	Max	Unit
Voltage Rating	@ 10 mA	–	+5.0	–	VDC
Contact Resistance	100 mΩ max.				
Contact Arrangement	SPST Momentary				
Chatter	10 ms max.				
Switch Travel	0.5mm +0 mm / -0.3mm				
Actuation Force	450 gf ± 200 gf				
Insulation Resistance	100 MΩ min. @ 250 VDC				
Dielectric Strength	300 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 Wash	350°C ± 5°C for 3 sec max.; Sn95Ag5 no clean solder 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.

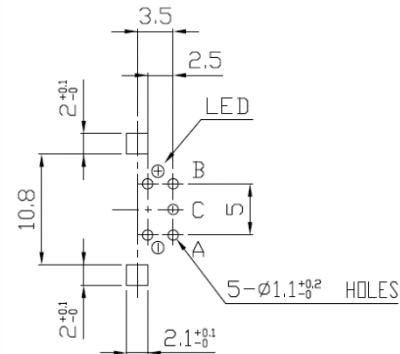
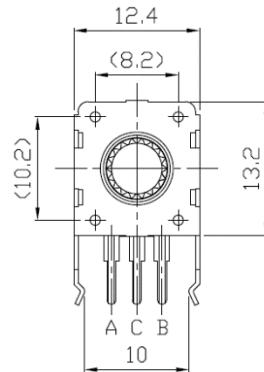
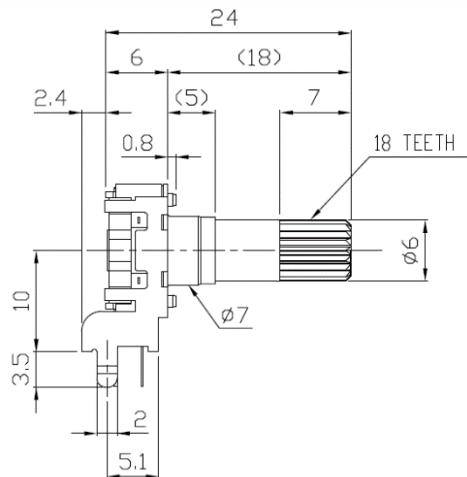
LED Specifications



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	72	20	2.7	3.3	3.7
	Orange	60	25	1.7	2.0	2.4
Green/Red	Green	95	25	2.7	3.3	3.7
	Red	60	25	1.7	2.0	2.4
Blue/Green	Blue	75	20	2.7	3.3	3.7
	Green	95	25	2.7	3.3	3.7
Green/Orange	Green	95	25	2.7	3.3	3.7
	Orange	60	25	1.7	2.0	2.4
Blue/Red	Blue	75	20	2.7	—	3.3
	Red	60	25	1.7	—	2.4
Red/Green/Blue	Red	60	25	1.7	2.0	2.4
	Green	110	25	2.7	3.3	3.7
	Blue	110	25	2.7	3.3	3.7

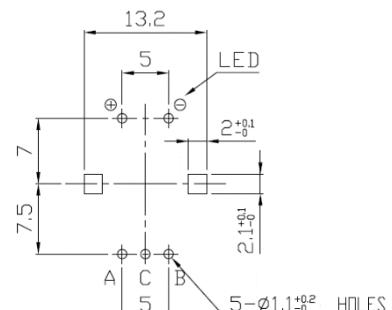
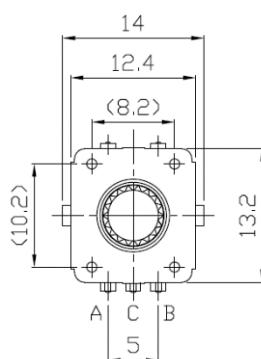
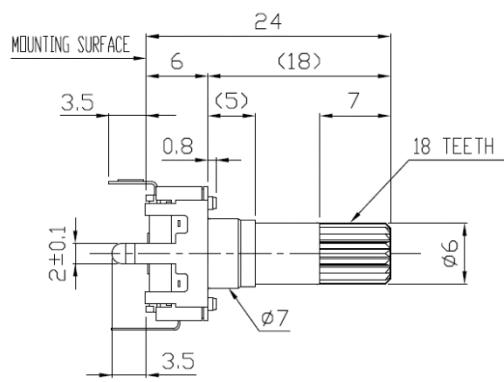
Mechanical Specifications

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

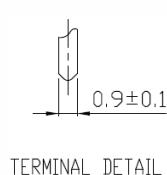


P.C.B. MOUNTING DETAIL
(TOLERANCE ± 0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B) $t=1.6\text{mm}$

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



P.C.B. MOUNTING DETAIL
(TOLERANCE ± 0.1)
*VIEWED FROM MOUNTING SIDE
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CIRCUIT DIAGRAM

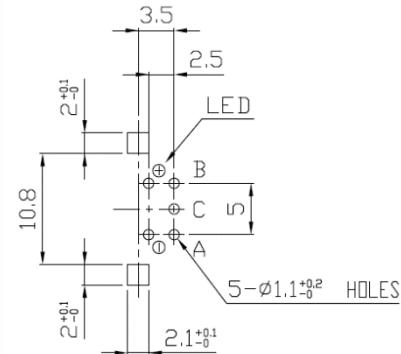
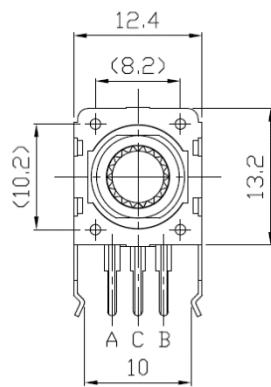
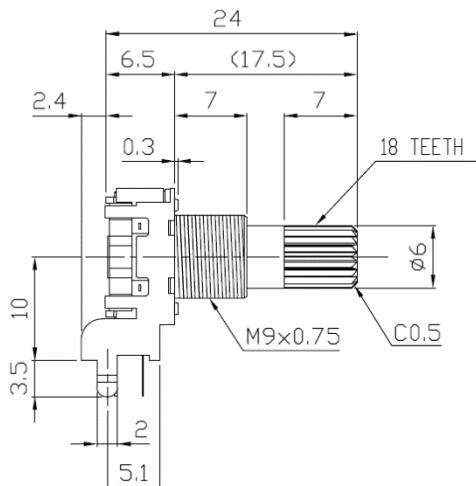


TOLERANCES UNLESS OTHERWISE SPEC	
$L \leq 10$	± 0.3
$10 < L \leq 100$	± 0.5
$100 < L$	± 0.8
ANGULAR DIMENSION	$\pm 5^\circ$

Unit: mm

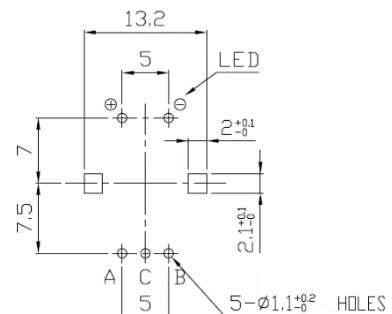
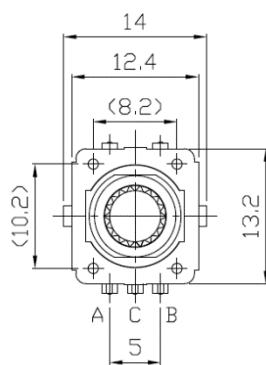
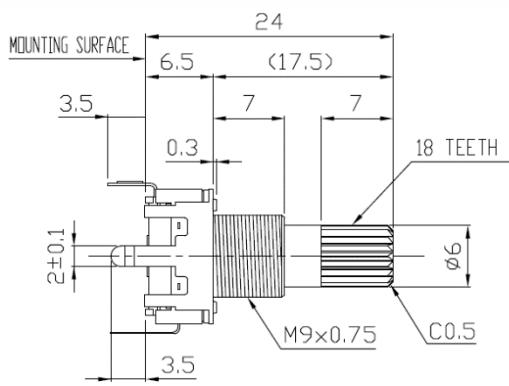
Mechanical Specifications

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

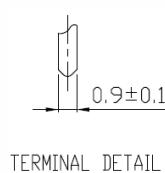


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Series 12CE Vertical/Rear Mount with Threaded Bushing and 1-Color LED



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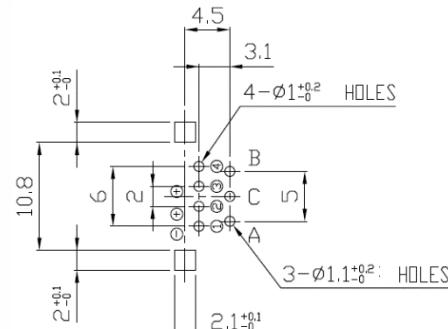
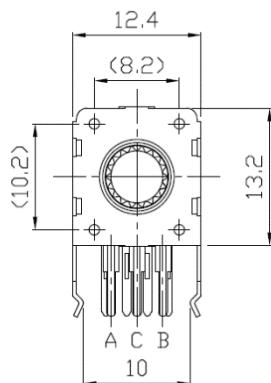
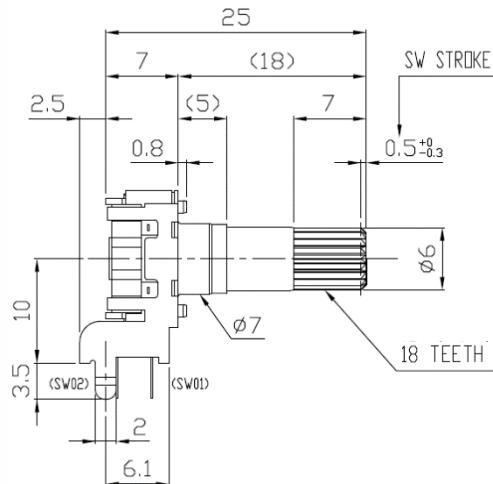


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ANGULAR DIMENSION	$\pm 5^\circ$

Unit: mm

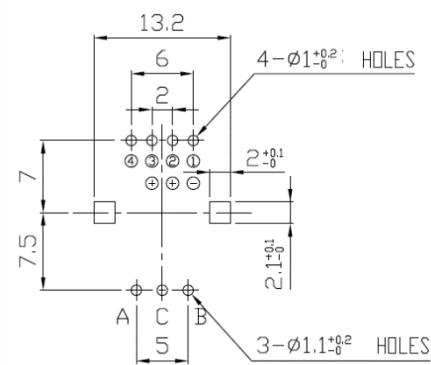
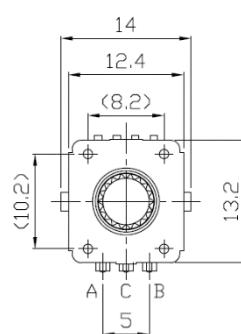
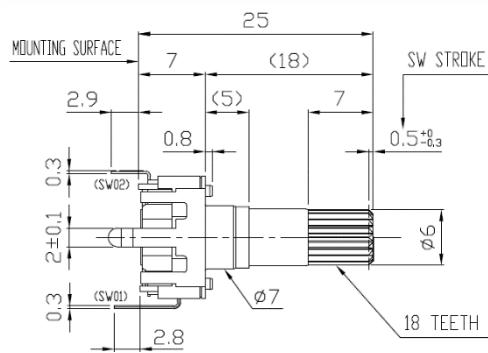
Mechanical Specifications

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

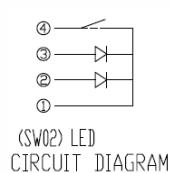
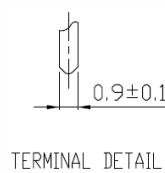


P.C.B. MOUNTING DETAIL
(TOLERANCE ± 0.1)
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(P.C.B) $t=1.4\text{mm}$

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



P.C.B. MOUNTING DETAIL
(TOLERANCE ± 0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B) $t=1.4\text{mm}$



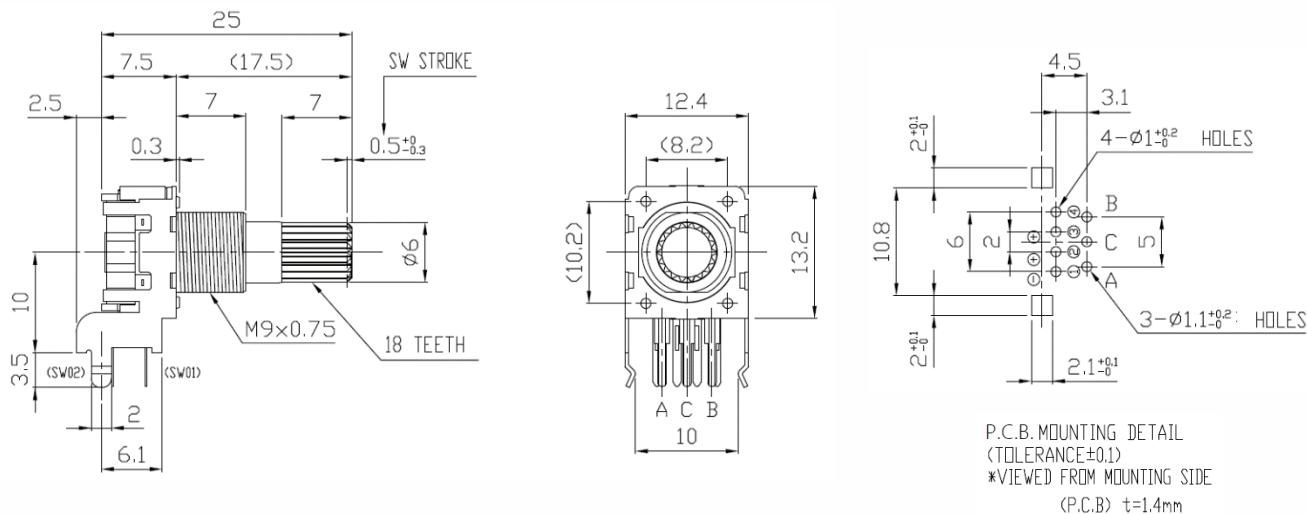
Unit: mm

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)

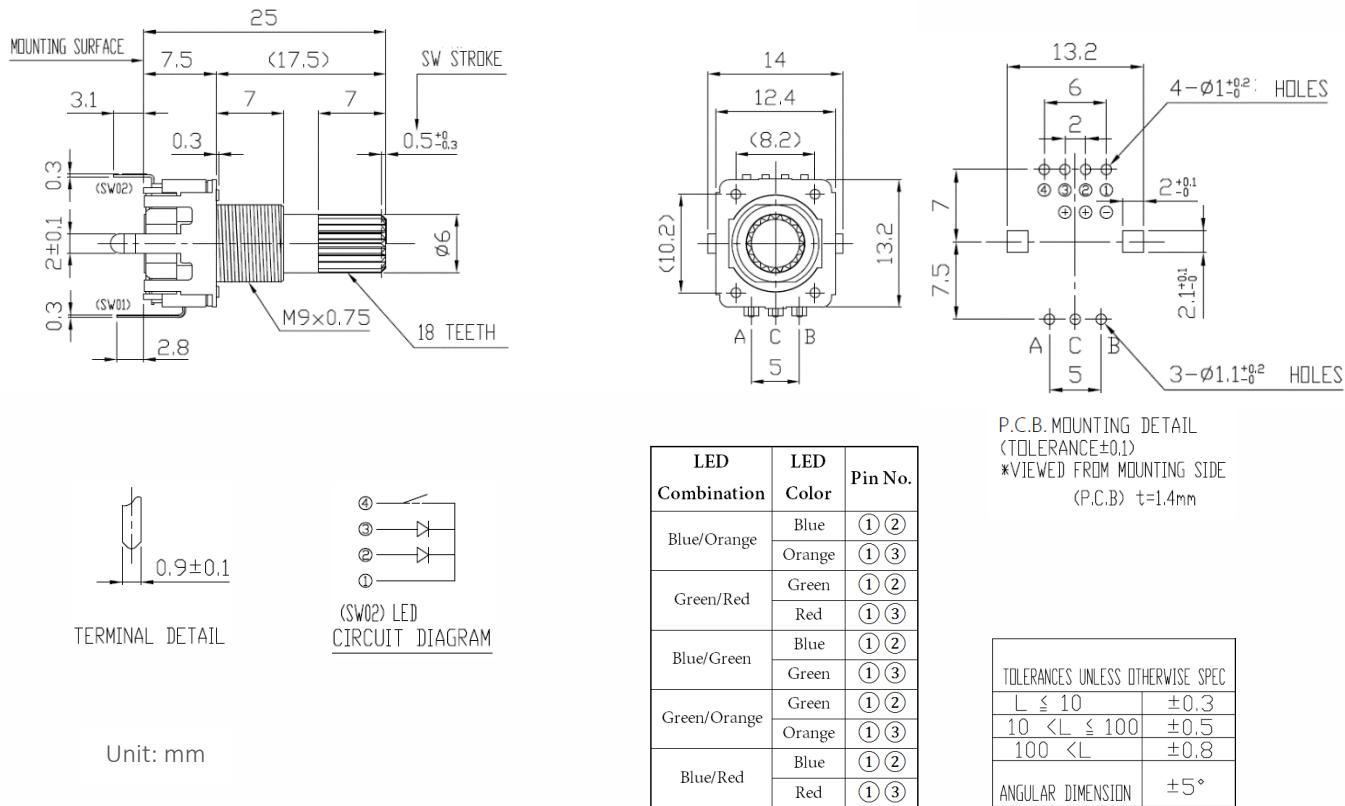
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$10 < L \leq 100$	± 0.5
$100 < L$	± 0.8
ANGULAR DIMENSION	$\pm 5^\circ$

Mechanical Specifications

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

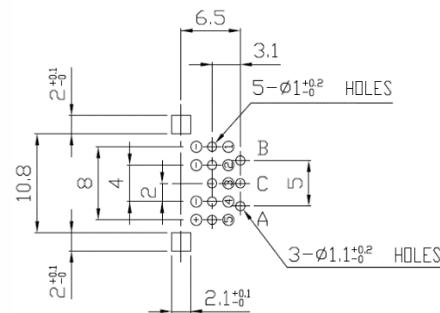
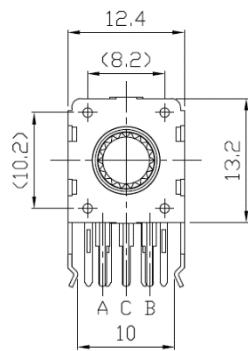
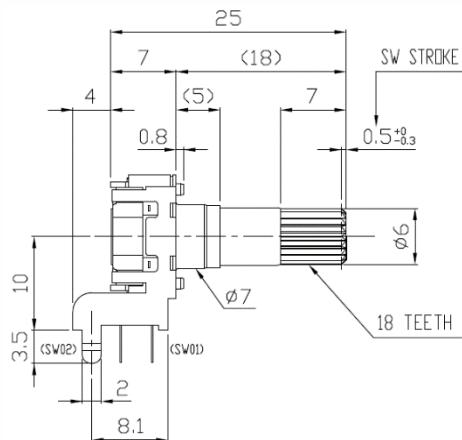


Series 12CE Vertical/Rear Mount with Threaded Bushing and 2-Color LED



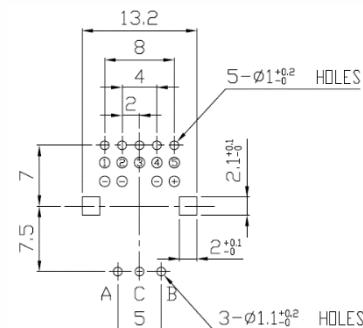
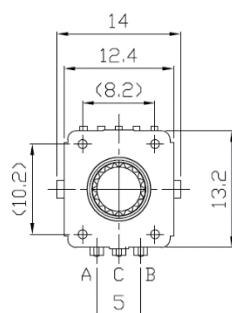
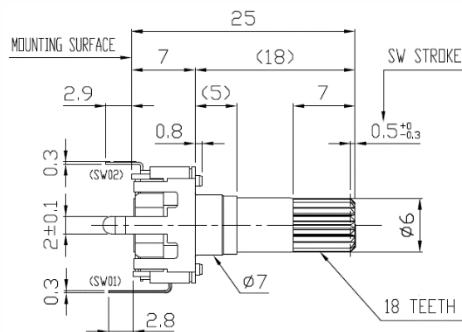
Mechanical Specifications

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

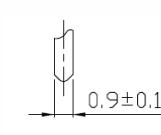


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(TOLERANCE ± 0.1)
*VIEWED FROM MOUNTING SIDE
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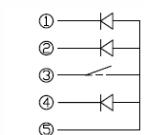
Series 12VR Vertical/Rear Mount with Sleeve Bushing and 3-Color LED



P.C.B. MOUNTING DETAIL
(TOLERANCE ± 0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B) $t=1.6\text{mm}$



TERMINAL DETAIL



(SW02) LED CIRCUIT DIAGRAM

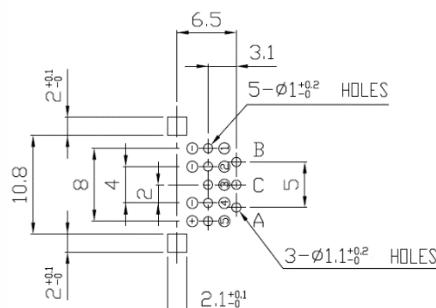
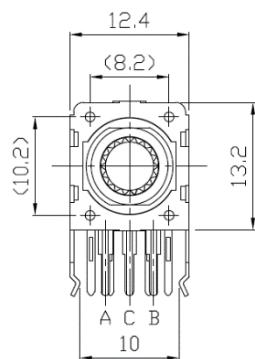
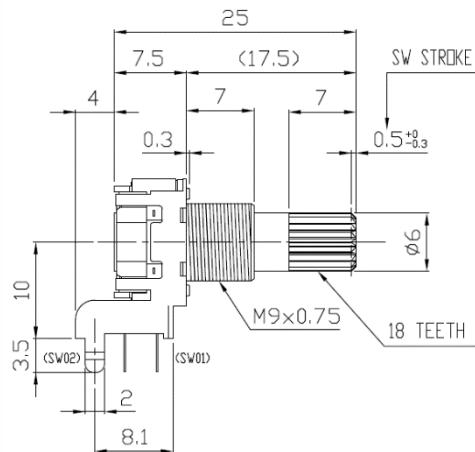
Unit: mm

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

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

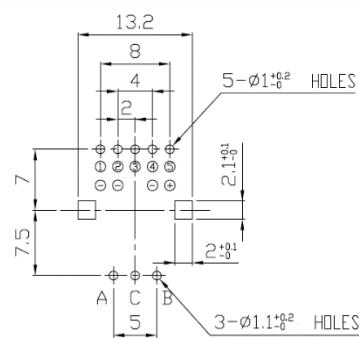
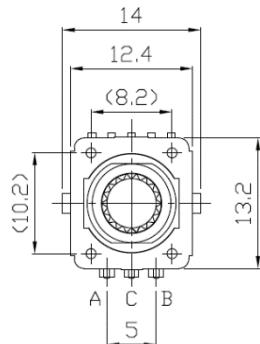
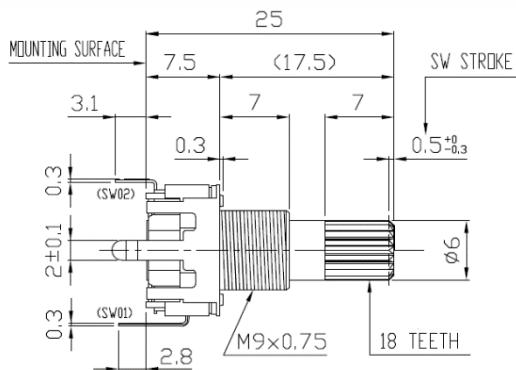
Mechanical Specifications

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

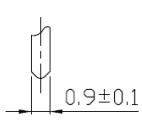


P.C.B. MOUNTING DETAIL
(TOLERANCE ± 0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B.) $\pm 1.6\text{mm}$

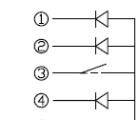
Series 12VR Vertical/Rear Mount with Threaded Bushing and 3-Color LED



P.C.B. MOUNTING DETAIL
(TOLERANCE ± 0.1)
*VIEWED FROM MOUNTING SIDE
(P.C.B.) $t=1.6\text{mm}$



TERMINAL DETAIL



(SW02) LED
CIRCUIT DIAGRAM

Unit: mm

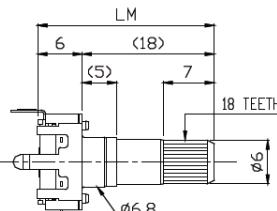
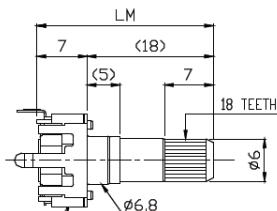
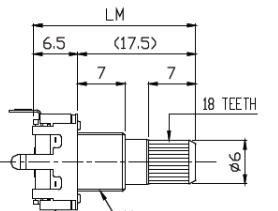
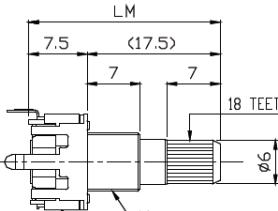
LED Combination	LED Color	Pin No.
Red/Green/Blue	Red	(1) (5)
	Green	(2) (5)
	Blue	(4) (5)

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

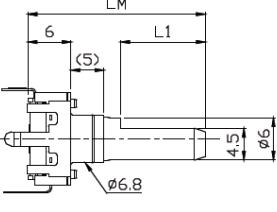
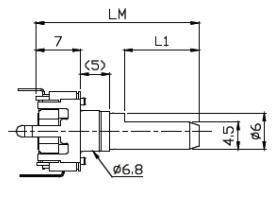
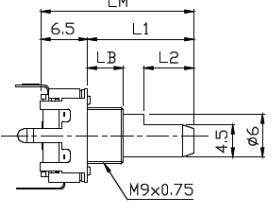
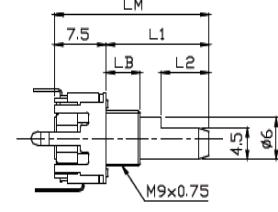
Mechanical Specifications

Series 12EC Shaft Length and Trim Options

Knurled Shaft Trim

Sleeve Bushing Single Color LED	Sleeve Bushing Dual and Tri-Color LED	Threaded Bushing Single Color LED	Threaded Bushing Dual and Tri-Color LED
			
LM	LM	LM	LM
24	25	24	25

Flatted Shaft Trim

Sleeve Bushing Single Color LED	Sleeve Bushing Dual and Tri-Color LED	Threaded Bushing Single Color LED	Threaded Bushing Dual and Tri-Color LED
			
LM	LM	LM	LM
L1	L1	L1	L1
15	3	15	5
17.5	5	17.5	5
20	7	20	5
25	12	25	5
		8.5	13.5
		3	7
		11	18.5
		5	5
		12	12
		18.5	18.5
		7	7
		5	5
		11	13.5
		3	7