



Highly reliable non-contact structure applicable to 31-point LED level indicator mounting.

Detector

Slide

Push

Rotary

Encoders

Power

Dual-in-line
Package Type

TACT Switch™

Metal
ShaftInsulated
ShaftHollow
ShaftRing
Type

Typical Specifications

Items	Specifications
Output signal	$V_{HI} : +4.0V \text{ min.}$ $V_{LO} : 0.5V \text{ max. (Isink=5mA)}$
Rating	10mA 5V $\pm$ 5% DC
Operating life	500,000 rotations
Operating temperature range	- 10°C to + 70°C

Product Line

Length of the shaft (mm)	Torque (mN·m)		Number of detent	Number of pulse	Operating direction	Push switch	Display function	Response time	Minimum order unit (pcs.)		Product No.	Drawing No.
	Rotational torque	Detent torque							Japan	Export		
15.5	7 max.	—	Without	40	Vertical	Without	Without	1.3 μ sec. (TYP)	480	960	EM20B4000000	1
						EM20B4010000						
16	—	8 ± 5	40			With						EM20B4014000
10							With (Color : orange)				EM20B4014A01	3

Notes

1. This product uses a Hall IC. Be aware of ESD damages.
2. Custom design for shaft configuration are available upon request.

Packing Specifications

Number of packages (pcs.)		Export package measurements (mm)
1 case / Japan	1 case / export packing	
480	960	378 × 527 × 262

Dimensions

Unit:mm

No.	Photo	Style	PC board mounting hole dimensions (Viewed from mounting side)
1			VA, VB ... Power supply GA, GB ... Ground A, B Out put

EM20B

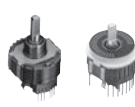
Unit:mm

TACT Switch™

Ring Type

- DATA (display data)
- LATCH (display data latch signal)
- CLK (data transfer clock)

List of Varieties

Type		Metal shaft											
		11mm size							20mm size				
Series		EC111		EC11EH		EC11K		EC11J		EC20A / RK203		EM20B	
Photo													
Output		Self-return switch		Incremental (Three phase A, B and C)		Incremental (Two phase A and B)							
Shaft types		Single-shaft											
Operating direction		Vertical											
Number of pulse / Number of detent		—		6×ABC / 18 10×ABC / 30		9 / 18 15 / 30			18 / 18		40 / 40		
Features		—		—		—		Surface Mount Type		—		Magnetic type; LED indicator option	
Dimensions (mm)	W	11.7							20.2		20		
	D	13		12			14.2		19.2		22.25		
	H	5		4.5					10		13		
Operating temperature range		−40℃ to + 85℃							−30℃ to + 80℃		−10℃ to + 70℃		
Operating life		15,000 cycles		30,000 cycles		100,000 cycles			30,000 cycles		500,000 rotations		
Automotive use												—	
Life cycle (availability)													
Electrical performance	Rating	10mA 5V DC							1mA 5V DC		10mA 5V±5% DC		
	Max./min. operating current (Resistive load)	10mA / 1mA							—		15mA / —		
	Insulation resistance	100M Ω min. 250V DC							10MΩ min. 50V DC		100MΩ min. 250V DC		
	Voltage proof	300V AC for 1 minute or 360V AC for 2s				300V AC for 1 minute or 360V AC for 1s			50V AC for 1 minute or 60V AC for 2s		300V AC for 1 minute or 360V AC for 2s		
Mechanical performance	Rotational torque (Without detent)	3 to 30mN·m		—							7mN·m max.		
	Detent torque	—		10±7mN·m		12 ± 5mN·m			40±20mN·m		8±5mN·m		
	Push-pull strength	100N											
Shaft configuration		Flat, Slotted, Serrated							Flat				
Terminal type		Insertion					Reflow		Insertion				
Switch Specifications	Switch type	Push-on switch											
	Contact arrangement	Single pole and single throw (Push-on)											
	Travel (mm)	0.5±0.3	1.5±0.5	0.5±0.3	1.5±0.5	0.5±0.3	1.5±0.5	0.5±0.3	1.5±0.5		0.5± ^{+0.4} _{−0.3}		
	Operating force (N)	6± ^{+2.5} _{−2}	4±2	6± ^{+2.5} _{−2}	4±2	5±2	4±2	5±2	4±2		6±3		
	Rating	0.1A 5V DC (500 μA 5V DC min. ratings)				0.1A 5V DC (0.1mA 5V DC min. ratings)				0.5A 16V DC (1mA 16V DC min. ratings)		0.1A 5V DC	
	Contact resistance	100m Ω max. for initial period; 200m Ω max. after operating life.											
	Operating life	20,000 times min.				1,000,000 times min.	100,000 times min.	1,000,000 times min.	100,000 times min.	20,000 times min.		25,000 times min.	
Page		161							170		172		

● Encoders Soldering Conditions 193

● Encoders Cautions 194

Note ● indicates applicability to all products in the series.

Reference for Hand Soldering

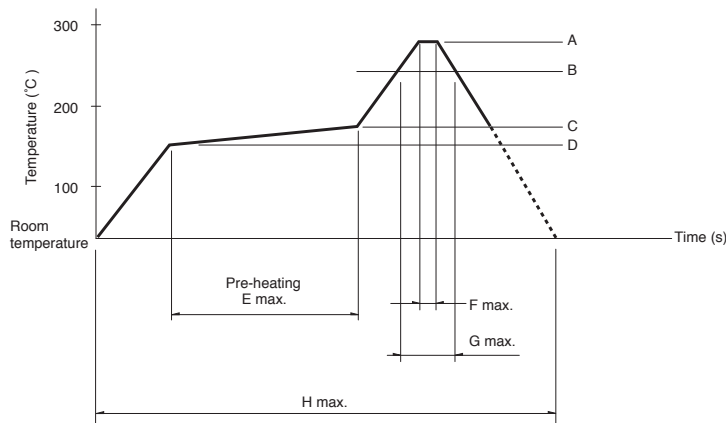
Series	Tip temperature	Soldering time	No. of solders
EC05E, EC09E, EC10E, EC111, EC11B, EC11E, EC11G, EC11K, EC12D, EC12E, EC18A, EC20A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC40A, EC45A, EC50A, EC60A, EM20B	350°C max.	3s max.	1 time
EC11J	350±10°C	3 ⁺¹ ₀ s	2 time

Reference for Dip Soldering

Series	Preheating		Dip soldering		No. of solders
	Soldering surface temperature	Heating time	Soldering temperature	Soldering time	
EC09E, EC11B, EC111, EC11E, EC11G, EC11K, EC18A, EC20A, EC21A, EC28A, EC35A, EC35AH, EC35B, EC50A	100°C max.	2 min. max.	260±5°C	5±1s	2 time max.
EC10E, EC12D, EC12E	100°C max.	1 min. max.	260±5°C	3±1s	2 time max.
EC40A	110°C max.	1 min. max.	260°C max.	10s max.	1 time
EC45A, EC60A	100°C max.	2 min. max.	260°C max.	5s max.	2 time max.
EM20B	80°C max.	1 min. max.	260°C max.	3s max.	2 time max.

Condition for Reflow

Temperature profile



Series	A	B	C	D	E	F	G	H	No. of reflows
EC11J	260°C	230°C	180°C	150°C	2 min.max.	3s	40s	4 min. max	2 time max.
EC05E	250°C min.	230°C min.	180°C	150°C	60s to 120s	—	30s to 40s	—	2 time max.

Notes

- When using an infrared reflow oven, solder may sometimes not be applied. Be sure to use a hot air reflow oven or a type that uses infrared rays in combination with hot air.
- The temperatures given above are the maximum temperatures at the terminals of the potentiometer when employing a hot air reflow method. The temperature of the PC board and the surface temperature of the potentiometer may vary greatly depending on the PC board material, its size and thickness. Ensure that the surface temperature of the potentiometer does not rise to 250°C or greater.
- Conditions vary to some extent depending on the type of reflow bath used. Be sure to give due consideration to this prior to use.