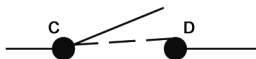
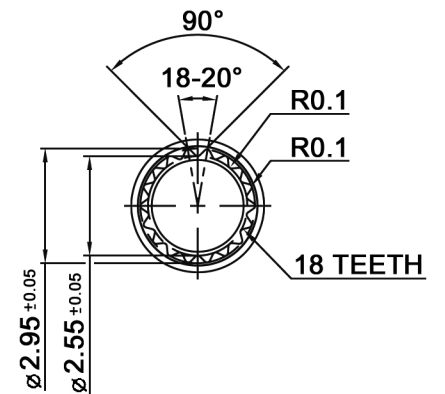
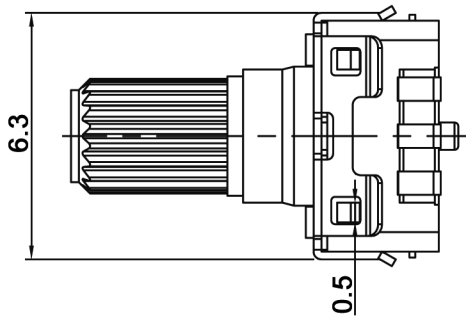
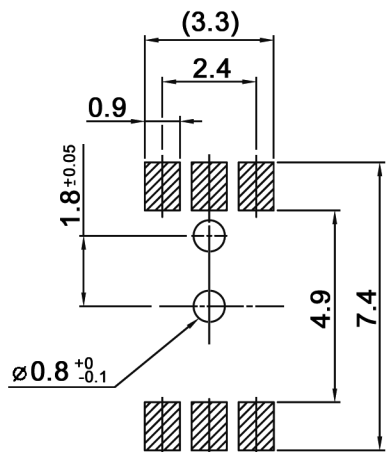


6x **A** common tolerance zone
 0.1

CIRCUIT DIAGRAM



P.C.B. MOUNTING HOLE



Compliance: RohS III (2015/863/EU)

Tolerances:	L≤10: ±0.3 mm	Date	Name	<h1>MERPS6-6210T</h1>
	10<L: ±0.5 mm	12/20	dr	
	100≤L: ±0.8 mm			
Coplanarity	07/21	dr	knitter-switch	<h2>30 45 36</h2>
Modifications	Date	Name		
				1/5

General

1.1 Application

This specification applies to 6mm size rotary encoder (incremental) for microscopic current circuits used in electronic equipment.

1.2 Standard atmospheric conditions

Unless otherwise specified the standard range of atmospheric conditions for making measurements and tests is as follows:

Ambient temperature: 15 to 35 °C
 Relative humidity: 25 to 85 %
 Air pressure: 860 to 1060 hPa

1.3 Temperature range

For operation: -40 to +85 °C
 For storage: -40 to +85 °C

Electrical characteristics of Encoder (Pushbutton characteristics see end of document)

2.1 Resolution

Number of pulses in 360° rotation: 6 (2 detents per pulse)

2.2 Output signal format

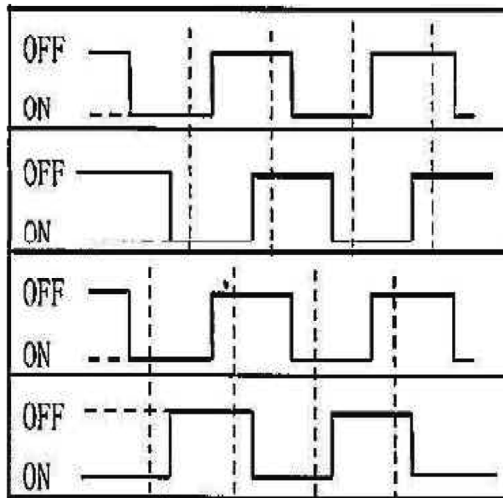
Signals A and B are phase-different, broken line is for detent positions.

Signal A is OFF or ON in detent position.

Signal B condition (OFF or ON) is not specified in detent position - below diagram is not binding.

Rotation clockwise

Terminal A - C



Terminal B - C

Rotation counter clockwise

Terminal A - C

Terminal B - C

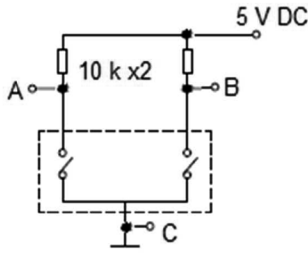
2.3 Switching characteristics

A rotation speed in the range of max. 360°/s is recommended for use in an application.

Measurements shall be made at a rotation speed of 360°/s and the following schematic:

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Tolerances: L≤10: ±0.3 mm 10<L: ±0.5 mm 100≤L: ±0.8 mm	Date	Name	<h1>MERPS6-6210T</h1>
	12/20	dr	
Coplanarity	07/21	dr	
Modifications	Date	Name	
knitter-switch			30 45 36
			Page 2/5



2.4 Sliding noise

In the following, ON-area is defined by voltage ≤ 1.5 V, OFF-area by voltage ≥ 3.5 V.

2.4.1 Chattering

Chattering is specified by the signal's passage time from 3.5 V to 1.5 V (time t_1) and from 1.5 V to 3.5 V (time t_3)

Chattering t_1, t_3 : ≤ 3 ms

2.4.2 Bounce

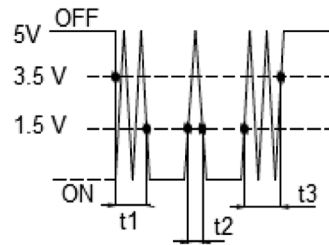
Bounce is specified by the period of time the voltage change exceeds 1.5V in ON area (time t_2). When t_2 is ≤ 1 ms it is considered as part of chattering.

If the time period between 2 bounces is ≤ 1 ms, the 2 bounces count as 1.

Bounce t_2 : ≤ 2 ms

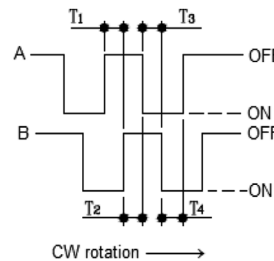
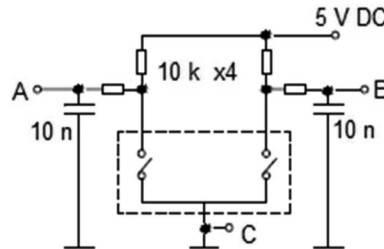
2.4.3. Sliding noise

The voltage change in OFF area: ≥ 3.5 V



Note:

To avoid chattering a masking time for t_1 and t_2 is recommended in signal processing equipment as well as RC-filter as shown in the schematic. Masking time and RC components should be defined according to actual operation environment.



2.5 Phase difference

Measurement shall be made under constant shaft rotation speed of 360°/s

Phase difference: $\Delta T \geq 5$ ms

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Tolerances: L \leq 10: ± 0.3 mm 10<L: ± 0.5 mm 100 \leq L: ± 0.8 mm	Date	Name	<h1>MERPS6-6210T</h1>
	12/20	dr	
Coplanarity	07/21	dr	
Modifications	Date	Name	
knitter-switch			30 45 36
			Page 3/5

2.6 Insulation resistance

Resistance is determined at 250 V DC and measured between terminals and bushing

Resistance: $\geq 50 \text{ M}\Omega$

2.7 Dielectric strength

Time is determined at 100 V AC and a leakage current $\leq 1 \text{ mA}$. There shall be no damage, arc or breakdown.

Dielectric strength: 1 min (100 V)

2.8 Rating

5V DC, 10 mA (min. 500 μA)

Mechanical

3.1 total rotational angle: 360° (endless)

3.2 detent torque: $2.5 \pm 1.5 \text{ Ncm}$ after reflow

3.3 detents per turn/step angle: 12 detents, angle $30^\circ \pm 3^\circ$

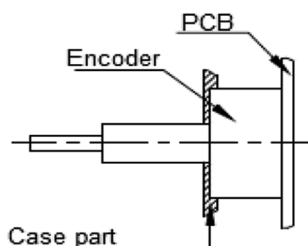
3.4 Push-pull strength of shaft: 20 N for 5 s

3.5 Shaft wobble at 3 N to the tip: $\leq 0.25 \text{ mm}$

3.6 rotation play in detent position: $\leq 4^\circ$

Note:

Consider to fix the encoder by case parts in addition to solder joints



4.1 rotational life

Determined by applying 600 to 800 cycles per hour. 1 cycle is 360° CW rotation followed by 360° CCW rotation. Detent torque must remain within $\pm 50\%$ of specified value. Chattering t_1, t_3 must remain $\leq 4 \text{ ms}$, bounce t_2 must remain $< 3 \text{ ms}$, shaft wobble must remain max. 150 % of specified value, shaft play must remain $\leq 6^\circ$

Rotational life: 50 000 cycles

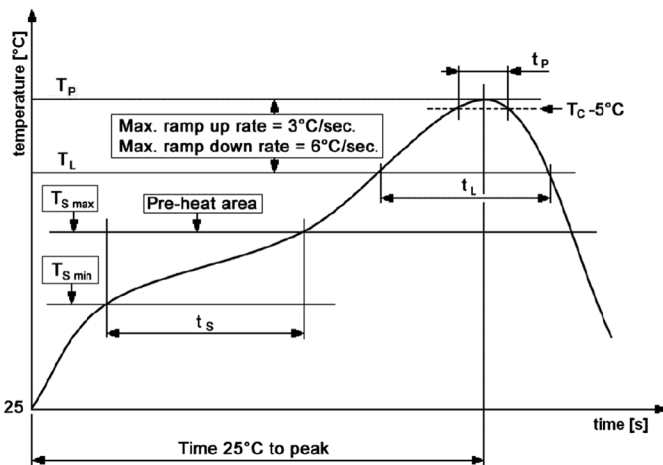
Soldering

5.1. Reflow soldering

Soldering should be done by IR-reflow oven, single pass. Limitations:

Compliance: RohS III (2015/863/EU)

Tolerances: L \leq 10: $\pm 0.3 \text{ mm}$ 10<L: $\pm 0.5 \text{ mm}$ 100 \leq L: $\pm 0.8 \text{ mm}$	Date	Name	<h1>MERPS6-6210T</h1>
	12/20	dr	
Coplanarity	07/21	dr	<h2>30 45 36</h2>
Modifications	Date	Name	
			Page 4/5



$T_P = 260^\circ\text{C}$
 $t_P = 10\text{sec. max.}$

$T_L = 217^\circ\text{C}$
 $t_L = 90\text{sec. max.}$

$T_{S\text{max}} = 200^\circ\text{C}$
 $T_{S\text{min}} = 150^\circ\text{C}$
 $t_S = 120\text{sec. max.}$

Pushbutton Switch Characteristics

- 6.1 Contact resistance determined by voltage drop: $\leq 100\text{ m}\Omega$
- 6.2 Bounce during a speed of 1 cycle per second: $\leq 10\text{ ms}$
- 6.3 Insulation resistance: see 2.6
- 6.4 Dielectric strength: see 2.7
- 6.5 Rating: see 2.8
- 7.1 Switch function: SPST, momentary ON
- 7.2 Switch travel: $0.1 +0.2/-0\text{ mm}$
- 7.3 Actuation force: $4\text{ N} \pm 1\text{ N}$

8.1 Mechanical life

Mechanical life is determined at approx. 30 operations per second, contact resistance remains $\leq 200\text{ m}\Omega$, chapter 6.1. to 6.4 and 7.1 to 7.3 are valid

Mechanical life: 50 000 cycles

Compliance: RohS III (2015/863/EU)

Tolerances: L≤10: ±0.3 mm 10<L: ±0.5 mm 100≤L: ±0.8 mm	Date	Name	<h1>MERPS6-6210T</h1>
	12/20	dr	
Coplanarity	07/21	dr	<h2>30 45 36</h2>
Modifications	Date	Name	
			Page
			5/5