

Series 70

Characteristics

The Series 70 consists of special short stroke pushbuttons for use with membrane keyboards. It is particularly suited for:

- PCBs

The use of single LEDs ensures that the entire control panel is very well illuminated. The module is offered in six colours and in a round or square design.

Functions

The Series 70 incorporates the following functions:

- Indicator
- Pushbutton
- Illuminated pushbutton

Market segments

The EAO Series 70 is especially suited for applications in the segments:

- Machinery and Automation
- Medicinal technology
- Laboratory and measuring equipment

Please refer to the EAO website to obtain detailed information regarding this series www.products.eao.com
Configure a product to your exact needs and request a quotation.



Overview
PCB pushbuttons

Illumination element	4
Switching element without illumination	5
Switching element with illumination	6

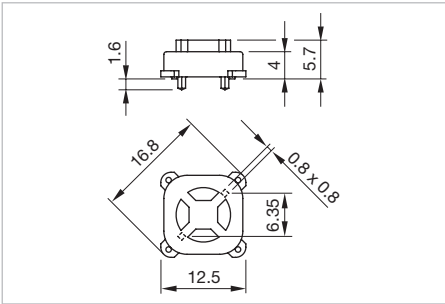
Accessories **7**
Drawings **10**
Technical data **11**
Application guidelines **13**
Index **15**

70 PCB pushbuttons

Illumination element



Product can differ from the current configuration.



Dimensions

Equipment consisting of (schematic overview)

**Lens**

**LED**

**Illumination element**

page 7

Each Part Number listed below includes all the black components shown in the 3D-drawing.

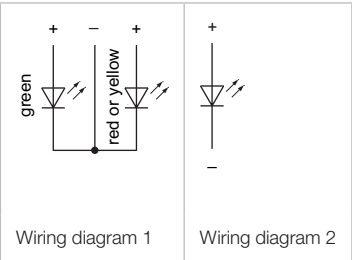
To obtain a complete unit, please select the red components from the pages shown.

Additional Information

- The customer has to decide what series resistor shall be used to the LED
- Dimensions with fitted lens see details «Lens»
- Luminosity and wave length variations caused by LED manufacturing processes may cause slight differences regarding the illumination

LED colour	Forward voltage typ.	Lumi. intensity	Dom. wavelength	Terminal	Part No.	Component layout	Wiring diagram	Weight
Illumination element								
Single-LED red	2.0 VDC @ 20 mA	160 mcd	625 nm	PCB	70-820.2S	3	2	0.001 kg
Single-LED green	3.2 VDC @ 20 mA	650 mcd	525 nm	PCB	70-820.5S	3	2	0.001 kg
Illumination element								
				PCB	92-800.042	1		0.001 kg

The component layouts you will find from page 10



Switching element without illumination

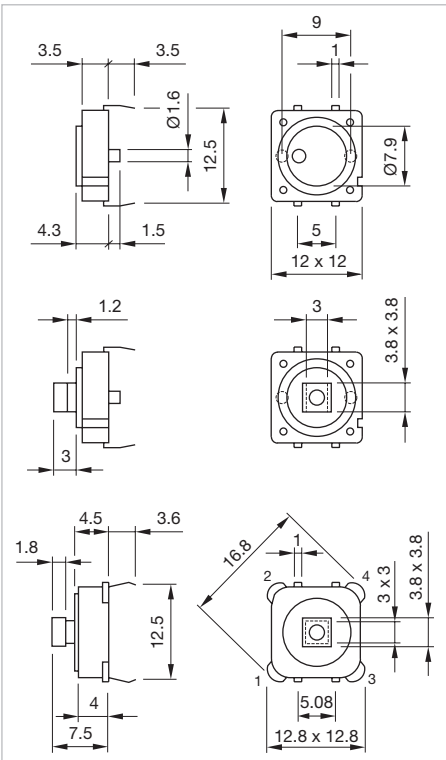
Equipment consisting of (schematic overview)

**Spacing cap** *page 8*

**Switching element**

Each Part Number listed below includes all the black components shown in the 3D-drawing.

To obtain a complete unit, please select the red components from the pages shown.



Dimensions



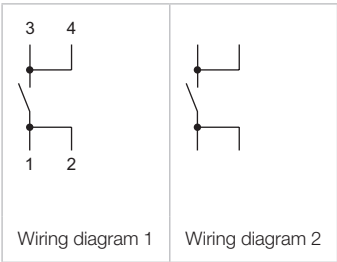
Product can differ from the current configuration.

Additional Information

- Contact normally open
- Switching action momentary
- Dimensions with fitted spacing cap see details «Spacing cap»

Product attribute	Contact material	Terminal	Part No.	Compo- nent layout	Wiring diagram	Weight
 Switching element without illumination						
without spacing cap	Silver	PCB	70-100.0	2	2	0.001 kg
 Switching element without illumination						
without spacing cap	Silver	PCB	70-101.0	2	2	0.001 kg
 Switching element without illumination						
without spacing cap	Gold-plated silver	PCB	70-201.0	1	1	0.001 kg

The component layouts you will find from page 10

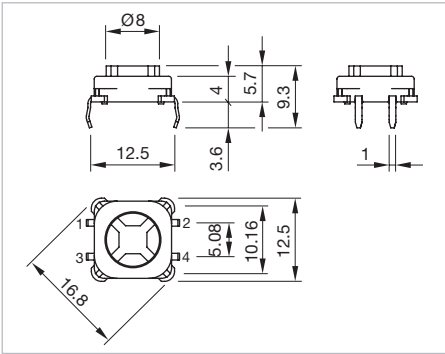


70 PCB pushbuttons

Switching element with illumination



Product can differ from the current configuration.



Dimensions

Equipment consisting of (schematic overview)

**Lens**page 7

**LED**

**Switching element**

Each Part Number listed below includes all the black components shown in the 3D-drawing.

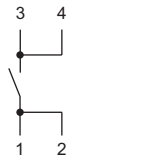
To obtain a complete unit, please select the red components from the pages shown.

Additional Information

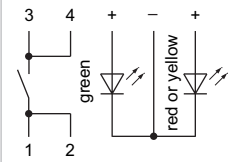
- Contact normally open
- Switching action momentary
- The customer has to decide what series resistor shall be used to the LED
- Luminosity and wave length variations caused by LED manufacturing processes may cause slight differences regarding the illumination
- Dimensions with fitted lens see details «Lens»

LED colour	Forward voltage typ.	Contact material	Lumi. intensity	Dom. wavelength	Terminal	Part No.	Component layout	Wiring diagram	Weight																																																		
Switching element with illumination <table><tr><td>Single-LED red</td><td>2.0 VDC @ 20 mA</td><td>Gold</td><td>160 mcd</td><td>625 nm</td><td>PCB</td><td>70-220.2S</td><td>4</td><td>3</td><td>0.001 kg</td></tr><tr><td>Single-LED yellow</td><td>2.9 VDC @ 20 mA</td><td>Gold</td><td>600 mcd</td><td>580 nm</td><td>PCB</td><td>70-220.4S</td><td>4</td><td>3</td><td>0.001 kg</td></tr><tr><td>Single-LED green</td><td>3.2 VDC @ 20 mA</td><td>Gold</td><td>650 mcd</td><td>525 nm</td><td>PCB</td><td>70-220.5S</td><td>4</td><td>3</td><td>0.001 kg</td></tr><tr><td>Single-LED blue</td><td>3.0 VDC @ 20 mA</td><td>Gold</td><td>250 mcd</td><td>467 nm</td><td>PCB</td><td>70-220.6S</td><td>4</td><td>3</td><td>0.001 kg</td></tr><tr><td>Single-LED white</td><td>3.2 VDC @ 20 mA</td><td>Gold</td><td>500 mcd</td><td>x=0.3/y=0.3</td><td>PCB</td><td>70-220.9S</td><td>4</td><td>3</td><td>0.001 kg</td></tr></table>										Single-LED red	2.0 VDC @ 20 mA	Gold	160 mcd	625 nm	PCB	70-220.2S	4	3	0.001 kg	Single-LED yellow	2.9 VDC @ 20 mA	Gold	600 mcd	580 nm	PCB	70-220.4S	4	3	0.001 kg	Single-LED green	3.2 VDC @ 20 mA	Gold	650 mcd	525 nm	PCB	70-220.5S	4	3	0.001 kg	Single-LED blue	3.0 VDC @ 20 mA	Gold	250 mcd	467 nm	PCB	70-220.6S	4	3	0.001 kg	Single-LED white	3.2 VDC @ 20 mA	Gold	500 mcd	x=0.3/y=0.3	PCB	70-220.9S	4	3	0.001 kg
Single-LED red	2.0 VDC @ 20 mA	Gold	160 mcd	625 nm	PCB	70-220.2S	4	3	0.001 kg																																																		
Single-LED yellow	2.9 VDC @ 20 mA	Gold	600 mcd	580 nm	PCB	70-220.4S	4	3	0.001 kg																																																		
Single-LED green	3.2 VDC @ 20 mA	Gold	650 mcd	525 nm	PCB	70-220.5S	4	3	0.001 kg																																																		
Single-LED blue	3.0 VDC @ 20 mA	Gold	250 mcd	467 nm	PCB	70-220.6S	4	3	0.001 kg																																																		
Single-LED white	3.2 VDC @ 20 mA	Gold	500 mcd	x=0.3/y=0.3	PCB	70-220.9S	4	3	0.001 kg																																																		
Switching element with illumination <table><tr><td></td><td></td><td>Gold</td><td></td><td></td><td>PCB</td><td>92-851.342</td><td>4</td><td>1</td><td>0.001 kg</td></tr></table>												Gold			PCB	92-851.342	4	1	0.001 kg																																								
		Gold			PCB	92-851.342	4	1	0.001 kg																																																		

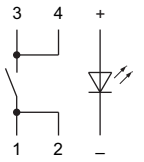
The component layouts you will find from page 10



Wiring diagram 1



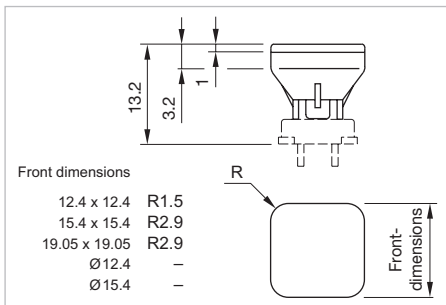
Wiring diagram 2



Wiring diagram 3

Front

Lens



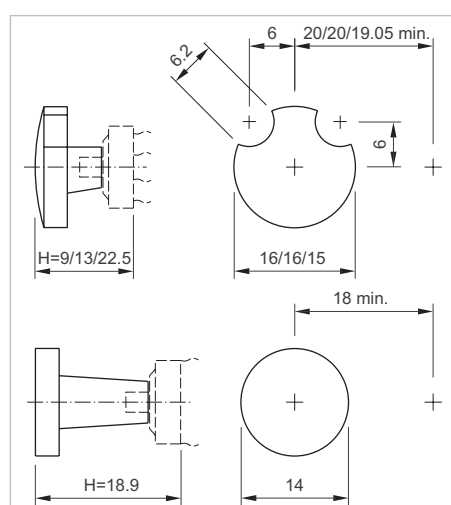
Dimensions

Lens	Part No.	Weight
 Lens, Front dimension 19.05 x 19.05 mm		
Plastic white translucent	70-920.9	0.001 kg
 Lens, Front dimension 15.4 x 15.4 mm		
Plastic red translucent	70-921.2	0.001 kg
Plastic orange translucent	70-921.3	0.001 kg
Plastic yellow translucent	70-921.4	0.001 kg
Plastic green translucent	70-921.5	0.001 kg
Plastic blue translucent	70-921.6	0.001 kg
Plastic white translucent	70-921.9	0.001 kg
 Lens, Front dimension 12.4 x 12.4 mm		
Plastic red translucent	70-922.2	0.001 kg
Plastic orange translucent	70-922.3	0.001 kg
Plastic yellow translucent	70-922.4	0.001 kg
Plastic green translucent	70-922.5	0.001 kg
Plastic blue translucent	70-922.6	0.001 kg
Plastic white translucent	70-922.9	0.001 kg
 Lens, Front dimension Ø 15.4 mm		
Plastic red translucent	70-911.2	0.001 kg
Plastic orange translucent	70-911.3	0.001 kg
Plastic yellow translucent	70-911.4	0.001 kg
Plastic green translucent	70-911.5	0.001 kg
Kunststoff weiss transluzent	70-911.9	0.001 kg

70 Accessories

Lens	Part No.	Weight
 Lens, Front dimension Ø 12.4 mm		
Plastic red translucent	70-912.2	0.001 kg
Plastic orange translucent	70-912.3	0.001 kg
Plastic yellow translucent	70-912.4	0.001 kg
Plastic green translucent	70-912.5	0.001 kg
Plastic white translucent	70-912.9	0.001 kg

Spacing cap



Dimensions

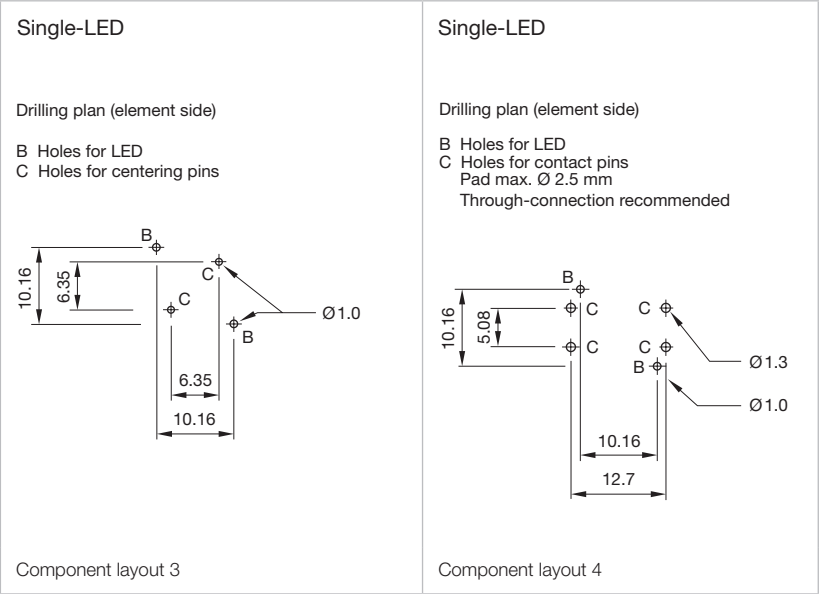
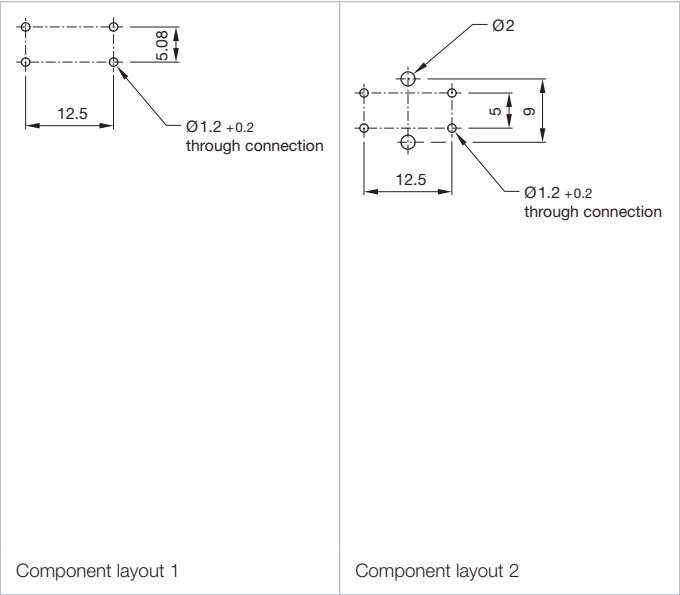
Product attribute	Part No.	Weight
 Spacing cap		
without recesses for LED, H = 18.9 mm	70-901.0	0.001 kg
2 recesses for LED, H = 9 mm	70-910.0	0.001 kg
2 recesses for LED, H = 13 mm	70-911.0	0.001 kg
2 recesses for LED, H = 22.5 mm	70-912.0	0.001 kg

Illumination**Single-LED, T1 Bi-Pin****Additional Information**

- The customer has to decide what series resistor shall be used to the LED
- Luminosity and wave length variations caused by LED manufacturing processes may cause slight differences regarding the illumination

LED colour	Forward voltage typ.	Lumi. intensity	Dom. wavelength	Part No.	Weight
 Single-LED					
Single-LED red	2.0 VDC @ 20 mA	160 mcd	625 nm	10-2601.3172S	0.001 kg
Single-LED orange	2.0 VDC @ 20 mA	165 mcd	605 nm	10-2601.3173S	0.001 kg
Single-LED yellow	2.9 VDC @ 20 mA	600 mcd	580 nm	10-2603.3174S	0.001 kg
Single-LED green	3.2 VDC @ 20 mA	650 mcd	525 nm	10-2603.3175S	0.001 kg
Single-LED blue	3.0 VDC @ 20 mA	250 mcd	467 nm	10-2603.3176S	0.001 kg
Single-LED white	3.2 VDC @ 20 mA	500 mcd	x=0.3/y=0.3	10-2603.3178S	0.001 kg

Drawings



Switching element illuminated Part No. 92-851.342

Switching system

Short-travel switching system with two independent contact points and tactile operation. Guarantees reliable switching even of very light loads.

1 normally open contact

Material

Material of contact

Gold-plated silver

Switching element

Thermoplastic Polyester (PET, PBT) and Polyacetale (POM)

Mechanical characteristics

Actuating force

with overlay foil 4 N $\pm$ 1,5 N

Max. actuating force > 50 N, as per DIN 42115

Actuating travel

0.4 mm

Rebound time

$\leq$ 1 ms

Resistance to heat of soldering

250 °C, 3 s (PCB assembly)

320 °C, 3 s (when using a soldering iron)

Mechanical lifetime

$\geq$ 5 Mio. operations (switching element without overlay)

$\geq$ 1 Mio. operations (switching element under overlay)

Electrical characteristics

Contact resistance

Starting value (initial) $\leq$ 100 m Ω , as per IEC 60512-2-2b

Isolation resistance

$\geq$ 1000 M Ω

Contact resistance

$\leq$ 100 m Ω

as per 500 000 cycles of operation at 12 VDC, 5 mA resistive load $\leq$ 200 m Ω

Electrical life

$\geq$ 500 000 operations at 42 VDC, 50 mA, as per IEC 60512-5-9c

When attention is paid to the direction of current flow from terminal 3/4 to 1/2 the electrical life can be prolonged.

Switch rating

Switching voltage VDC/VAC	min. 50 mV	max. 42 V
---------------------------	------------	-----------

Switching current VDC/VAC	min. 10 μ A	max. 100 mA
---------------------------	-----------------	-------------

Power rating	max. 2 W
--------------	----------

Electric strength

500 VAC, 50 Hz, 1 min, as per IEC 60512-2-4a

Environmental conditions

Storage temperature

-40 °C ... +85 °C

Operating temperature

-25 °C ... +70 °C

Approvals

Declaration of conformity

CE

Switching element non-illuminated Part No. 70-100.0 and 70-101.0

Switching system

Short-travel switching system with two independent contact points and tactile operation. Guarantees reliable switching even of very light loads.

1 normally open contact

Material

Material of contact

Silver (Ag)

Mechanical characteristics

Actuating force

with overlay foil 5 N $\pm$ 2 N

Max. actuating force > 50 N, as per DIN 42115

Actuating travel

0.3 mm

Rebound time

$\leq$ 5ms

Mechanical lifetime

> 1 Mio. operations with overlay

Electrical characteristics

Isolation resistance

$\geq$ 50 M Ω

Contact resistance

$\leq$ 100 m Ω

as per 500 000 cycles of operation at 12 VDC, 5 mA resistive load $\leq$ 200 m Ω

70 Technical data

Electrical life

at 5 VDC, 1 mA > 1 million operations
at 24 VDC, 1 mA > 100 000 operations

Switch rating

≤ 1 watt (resistive load)

Switch rating

≤ 24 VDC, ≤ 50 mA

Electric strength

250 VAC for 1 min.

Environmental conditions

Storage temperature

-30 °C ... +85 °C

Operating temperature

-20 °C ... +70 °C

Approvals

Declaration of conformity

CE

Switching element non-illuminated Part No. 70-201.0

Switching system

Short-travel switching system with two independent contact points and tactile operation. Guarantees reliable switching even of very light loads.
1 normally open contact

Material

Material of contact

Gold-plated silver

Switching element

Thermoplastic Polyester (PET, PBT) and Polyacetale (POM)

Mechanical characteristics

Actuating force

with overlay foil 2.1 N ±0.2 N
Max. actuating force > 50 N, as per DIN 42115

Actuating travel

max. 0.5 mm

Rebound time

≤ 1 ms

Resistance to heat of soldering

260 °C, 3 s, as per IEC 60068-2-20

Mechanical lifetime

≥ 5 Mio. operations (switching element without overlay)
≥ 1 Mio. operations (switching element under overlay)

Front protection

front with overlay foil IP 65

Electrical characteristics

Contact resistance

Starting value (initial) ≤ 100 mΩ, as per IEC 60512-2-2b

Isolation resistance

≥ 1000 MΩ

Contact resistance

≤ 100 mΩ
as per 500 000 cycles of operation at 12 VDC, 5 mA resistive load ≤ 200 mΩ

Electrical life

≥ 500 000 operations at 42 VDC, 50 mA, as per IEC 60512-5-9c
When attention is paid to the direction of current flow from terminal ¾ to ½ the electrical life can be prolonged.

Switch rating

Switching voltage VDC/VAC	min. 50 mV	max. 42 V
Switching current VDC/VAC	min. 10 mA	max. 100 mA
Switch rating	max. 2 W	

Electric strength

500 VAC, 50 Hz, 1 min, as per IEC 60512-2-4a

Environmental conditions

Storage temperature

-40 °C ... +85 °C

Operating temperature

-25 °C ... +70 °C

Approvals

Declaration of conformity

CE

EAO reserves the right to alter specifications without further notice.

Suppressor circuits

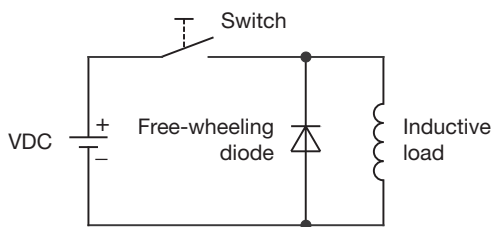
When switching inductive loads such as relays, DC motors, and DC solenoids, it is always important to absorb surges (e.g. with a diode) to protect the contacts. When these inductive loads are switched off, a counter emf can severely damage switch contacts and greatly shorten lifetime.

Fig. 1 shows an inductive load with a free-wheeling diode connected in parallel. This free-wheeling diode provides a path for the inductor current to flow when the current is interrupted by the switch. Without this free-wheeling diode, the voltage across the coil will be limited only by dielectric breakdown voltages of the circuit or parasitic elements of the coil. This voltage can be kilovolts in amplitude even when nominal circuit voltages are low (e.g. 12VDC) see Fig. 2.

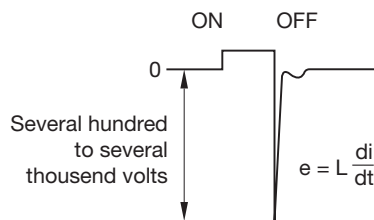
The free-wheeling diode should be chosen so that the reverse breakdown voltage is greater than the voltage driving the inductive load. The DC blocking voltage (V_R) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum current flowing through the load.

To get an efficient protection, the free-wheeling diode must be connected as close as possible to the inductive load!

Switching with inductive load
Fig. 1



Counter EMF
over load without free-wheeling diode
Fig. 2



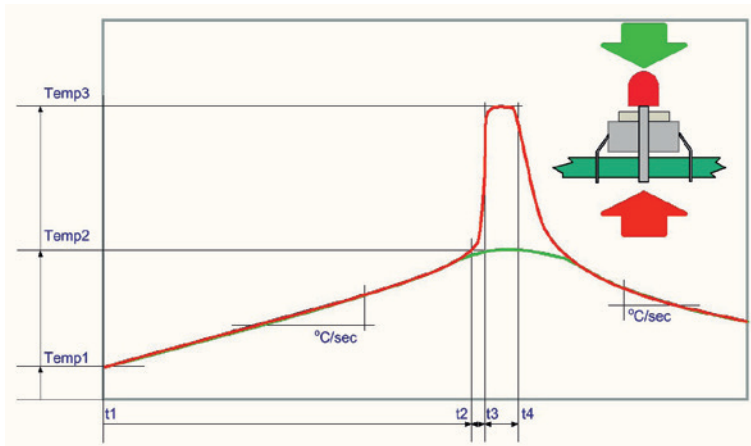
Note for soldering

Process parameter for wave soldering

Basic specification for wave soldering J-STD 75 W4C

Maximum temperature on the component side of the pcb (Temperature must not exceed during the entire processing)	120 °C
Preheating phase (t1 ... t2)	70 ... 120 sec
Ramp up	typ. + 1°C/sec
Ramp up to maximum temperature (t2 ... t3)	not defined
Maximum temperature on the soldering side (Temp 3)	250 °C
Maximum time of soldering process (t3 ... t4)	3 sec
Ramp down at 170 °C:	typ. -2 °C/sec

Temperature curve wave soldering



Green curve: Temperature on the component side of the pcb
 Red curve: Temperature on the soldering side of the pcb

Room temperature: Temp 1

Preheating: Temperature process = Temp 1 ... Temp 2
 Process time = t1 ... t2

Ramp up to soldering temperature: Process time = t2 ... t3

Soldering phase: Temperature process = Temp 3
 Process time = t3 ... t4

Iron soldering

Basic specification for iron soldering IEC 60068-2-20

Maximum temperature at tip of iron: 320 °C

Maximum soldering time: 3 sec

Cleaning/Lacquering

The switching elements are not sealed. Cleaning up the PCB may damage the contacts in the switching elements. For this reason, the following points should be noted:

- When soldering make sure that the flux does not pass on the upper side of the PCB.
- When cleaning the PCB with detergents ensure that no dust or other debris may get inside of the switching elements.
- Ensure that no lacquer penetrates into the interior of the switching element when lacquering the PCB.

Storage of components

To obtain the optimum solderability of the components, the following points should be noted during storage:

- Do not store components in locations with high temperature or humidity.
- Do not expose components to corrosive gases.
- Avoid direct sunlight for a long period.

Index from Part No.

Part No.	Page
10-2601.3172S.....	9
10-2601.3173S.....	9
10-2603.3174S.....	9
10-2603.3175S.....	9
10-2603.3176S.....	9
10-2603.3178S.....	9
70-100.0	5
70-101.0	5
70-201.0	5
70-220.2S.....	6
70-220.4S.....	6
70-220.5S.....	6
70-220.6S.....	6
70-220.9S.....	6
70-820.2S.....	4
70-820.5S.....	4
70-901.0	8
70-910.0	8
70-911.0	8
70-911.2	7
70-911.3	7
70-911.4	7
70-911.5	7
70-911.9	7
70-912.0	8
70-912.2	8
70-912.3	8
70-912.4	8
70-912.5	8
70-912.9	8
70-920.9	7
70-921.2	7
70-921.3	7
70-921.4	7
70-921.5	7
70-921.6	7
70-921.9	7
70-922.2	7
70-922.3	7
70-922.4	7
70-922.5	7
70-922.6	7
70-922.9	7
92-800.042	4
92-851.342	6

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

EAO:

[70-810.3](#) [70-810.4](#) [70-810.5](#) [70-820.5](#) [70-920.9](#) [70-820.4](#) [70-820.2S](#) [70-220.2S](#) [10-2603.3178S](#) [10-2603.3178K](#)
[10-2601.3172K](#) [10-2603.3176K](#) [10-2601.3174K](#) [10-2603.3175O](#) [10-2603.3175S](#) [10-2603.3174S](#)