



## General data

RF 15 (15 x 15 mm) and RF 19 (19 x 19 mm) with distinct key click, for use under an overlay or with RK 90 keycaps. Can be fully illuminated.

## Content

<b>RF 15 short-travel keyswitch</b>	<b>4 - 26</b>
RF 15 short-travel keyswitch, non-illuminated	4 - 28
RF 15 short-travel keyswitch, fully illuminated with 2 LEDs	4 - 29
RF 15 short-travel keyswitch, 1 LED spot-illumination	4 - 30
<b>RF 15 N short-travel keyswitch</b>	<b>4 - 32</b>
RF 15 N short-travel keyswitch, non-illuminated	4 - 35
<b>RF 15 R short-travel keyswitch</b>	<b>4 - 36</b>
RF 15 R low short-travel keyswitch, non-illuminated	4 - 39
RF 15 R high short-travel keyswitch, non-illuminated	4 - 39
RF 15 R low short-travel keyswitch, 1 LED spot-illumination	4 - 40
RF 15 R high short-travel keyswitch, 1 LED spot-illumination	4 - 41
<b>RF 15 H short-travel keyswitch</b>	<b>4 - 42</b>
RF 15 H short-travel keyswitch, non-illuminated	4 - 44
RF 15 H short-travel keyswitch, fully illuminated	4 - 45
<b>RF 15 signal indicator</b>	<b>4 - 46</b>
RF 15 signal indicator, fully illuminated, 1 LED	4 - 48
<b>RF 19 short-travel keyswitch</b>	<b>4 - 50</b>
RF 19 short-travel keyswitch, non-illuminated	4 - 53
RF 19 short-travel keyswitch, fully illuminated with 2 LEDs	4 - 54
RF 19 short-travel keyswitch, 1 LED spot-illumination	4 - 55
<b>RF 19 short-travel keyswitch, 1 NC + 1 NO</b>	<b>4 - 56</b>
RF 19 short-travel keyswitch, non-illuminated	4 - 58
RF 19 H short-travel keyswitch	4 - 60
RF 19 H keyswitch, non-illuminated	4 - 62
RF 19 H short-travel keyswitch, fully illuminated	4 - 63
<b>RF 19 signal indicator</b>	<b>4 - 64</b>
RF 19 signal indicator, 1/2 x 1-module	4 - 66
RF 19 signal indicator, 1/2 x 2-module	4 - 66
RF 19 signal indicator, 1 x 1-module	4 - 67
RF 19 signal indicator, 1 x 2-module	4 - 67
<b>PCB Keyswitches</b>	<b>4 - 23</b>

### RF special accessories

Extension plunger for RF 15 N, round head	4 - 68
Extension plunger for RF 15 N, round head, with recess for LED	4 - 69
Keycap for RF 15, snap-on, for overall height 12.5 mm	4 - 69
Spacers, round	4 - 70
Spacers, triangular	4 - 71
LED spacer for RF 15 N	4 - 72

# Specifications LED

## 3 mm LED

(valid for 25 °C)	Red LED	Green LED	Yellow LED
Max. forward current I <sub>F</sub> :	30 mA	30 mA	20 mA
Current reduction from: T <sub>0</sub> = 50 °C:	approx 0.5 mA/°C	approx 0.5 mA/°C	approx 0.2 mA/°C
Wavelength typ:	635 nm	565 nm	586 nm
Forward voltage U <sub>F</sub> /I <sub>F</sub> typ:	2 V/10 mA	2 V/10 mA	2 V/10 mA
Reverse voltage U <sub>R</sub> /I <sub>F</sub> typ:	5 V/100 µA min.	5 V/100 µA min.	5 V/100 µA min.
Ambient temperature, operating:	- 20 °C ... + 80 °C	- 20 °C ... + 80 °C	- 20 °C ... + 80 °C
	Blue LED	White LED	Green LED superbright
Max. forward current I <sub>F</sub> :	20 mA	25 mA	30 mA
Current reduction from: T <sub>0</sub> = 50 °C:	approx 0.6 mA/°C	-	-
Wavelength typ:	470 nm	-	510-545 nm
Forward voltage U <sub>F</sub> /I <sub>F</sub> typ:	2.7 V/10 mA	3.6 V/20 mA	3.5 V/20 mA
Reverse voltage U <sub>R</sub> /I <sub>F</sub> typ:	5V/100 µA min.	-	-
Ambient temperature, operating:	- 20 °C ... + 80 °C	- 20 °C ... + 80 °C	-30 °C ... + 100 °C

## 2 mm LED

(valid for 25 °C)	Red LED	Green LED	Yellow LED
Max. forward current I <sub>F</sub> :	30 mA	30 mA	50 mA
Current reduction from: T <sub>0</sub> = 50 °C:	0.5 mA/°C	0.5 mA/°C	0.8 mA/°C
Light current f <sub>v</sub> /I <sub>F</sub> typ:	-	-	250 mIm/20 mA
Wavelength typ:	637 nm	569 nm	590 nm
Forward voltage U <sub>F</sub> /I <sub>F</sub> typ:	1.8 V/20 mA	2.1 V/10 mA	1.9 V/20 mA
Reverse voltage U <sub>R</sub> /I <sub>F</sub> typ:	5 V/100 µA min.	5 V/100 µA min.	5 V/100 µA min.
Ambient temperature, operating:	- 55 °C ... + 100 °C	- 40 °C ... + 100 °C	-40 °C ... + 100 °C
	Blue LED	Multi-colour LED	
Max. forward current I <sub>F</sub> :	30 mA	30 mA	
Current reduction from: T <sub>0</sub> = 50 °C:	-	approx 0.6 mA/°C	
Light current f <sub>v</sub> /I <sub>F</sub> typ:	-	-	
Wavelength typ:	464-485 nm	635/565 nm	
Forward voltage U <sub>F</sub> /I <sub>F</sub> typ:	3.6 V/20 mA	2 V/10 mA	
Reverse voltage U <sub>R</sub> /I <sub>F</sub> typ:	-	-	
Ambient temperature, operating:	- 20 °C ... + 80 °C	- 20 °C ... + 80 °C	

Calculating the series resistor:	Rated power of series:	Example for 5 Volt:
$R_V = \frac{U_B - U_F}{I_F}$	$P_V = I_F^2 \times R_V$	$R_V = \frac{5V - 2.0 V}{0.02 A} = 150 \Omega (= \text{standard value})$

## RF 15 short-travel keyswitch



### General data

Low-profile keyboards with RF 15 components should be designed with a 19.05 mm grid. With this grid, frame webs remain free between the individual keys. The overlay can be glued onto these frame webs; we recommend area embossing over the keys for the overlays.

### Technical data

#### General information

Colour of lens see order block  
 Recommended key grid 19.05 mm

#### Dimensions

Length 15 mm  
 Width 15 mm  
 Overall height 9.7 mm

#### Mechanical design

Mounting soldering into PCB  
 Terminals contacts tin-plated, fix contact Ag plated  
 Contact system snap-action contact  
 Contact arrangement 1 NO  
 Contact materials Au/Ag  
 Illumination spot-/fully illuminated  
 LED colour see order block  
 LED type see order block

#### Mechanical characteristics

Operating force max. 2 ... 3 N  
 Operating travel 0.5 mm  
 Switching travel 0.5 mm  
 Robustness min. with through-plated PCB  
 100 N

#### Electrical characteristics

Rated voltage min. Au: 0.02 V, Ag: 3 V  
 Rated voltage max. Au: 42 V, Ag: 50 V  
 Rated current min. Au: 0,01 mA, Ag: 0,1 mA  
 Rated current max. Au: 100 mA, Ag: 250 mA

Rated power max. (ohmic load) Au: 2 W, Ag: 12.5 W  
 Contact resistance when new max. 100 mΩ  
 Contact resistance acc. to life max. 3 Ω  
 Insulation resistance 10<sup>9</sup> Ω  
 ESD strength (underneath overlay) 15 kV  
 Bouncing time max. 5 ms

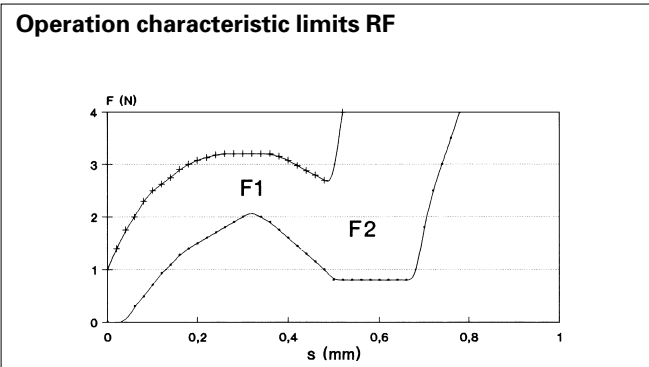
#### Other specifications

Ambient temp. operating min. -25 °C  
 Ambient temp. operating max. +70 °C  
 Storage temperature min. -40 °C  
 Storage temperature max. (product) +80 °C  
 Storage temperature max. (in tube) +50 °C  
 Resistance to constant environment according to IEC 600 68-2-3 and 2-30  
 Resistance at variable environment according to IEC 600 68-2-14 and 2-33  
 Operating life min. 1,000,000  
 Soldering time max. 2,5 sec.  
 Soldering temperature max. 250 °C  
 Flammability of materials UL 94 HB

4

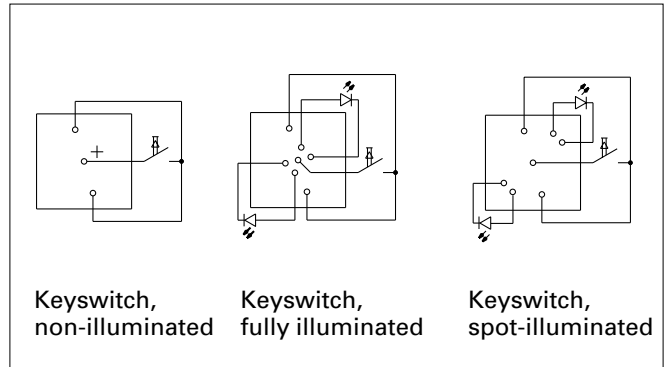
RF

Force/Travel Diagram – Keyswitch RF 15



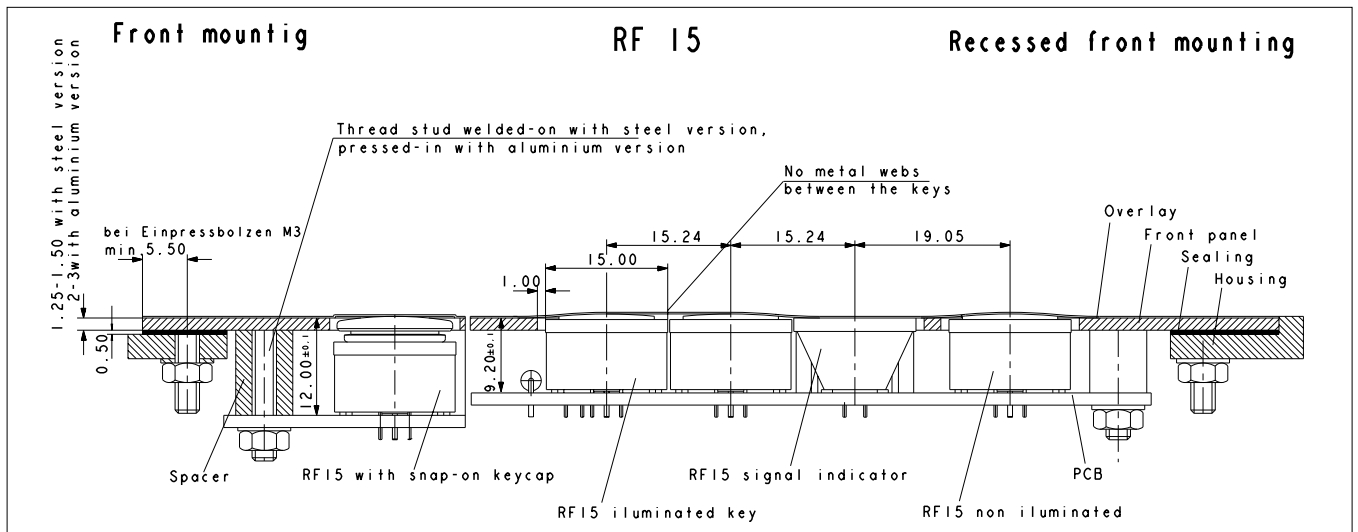
F 1 = Max. operating force  
 F 2 = Force at contact  
 F 2 is max. 55% of F 1

Circuit Diagram – Keyswitch RF 15

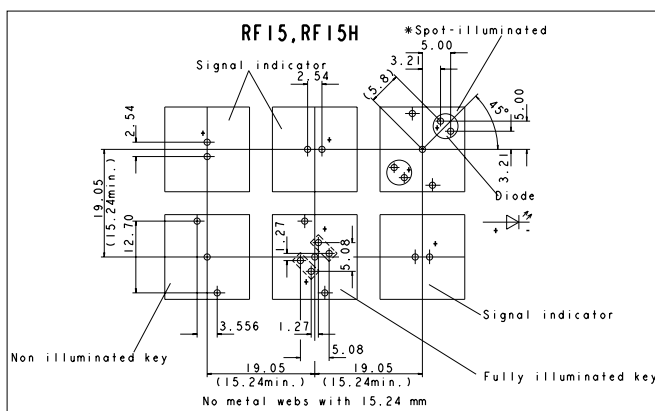


Keyswitch, non-illuminated      Keyswitch, fully illuminated      Keyswitch, spot-illuminated

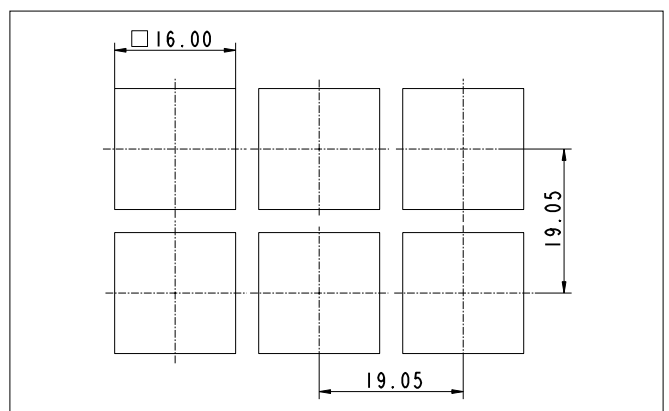
Dimensional Drawing RF 15



Hole Pattern RF 15

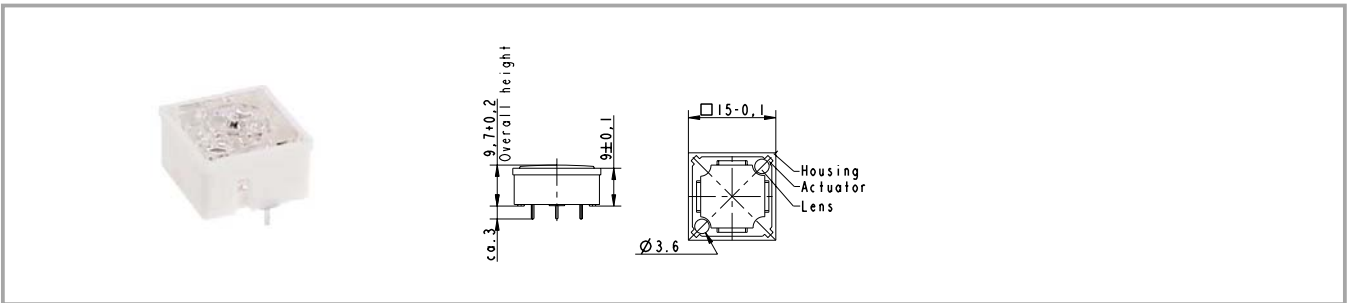


Hole Pattern – Front Panel



View on component side, all hole diameters 1,1 +/- 0,1 mm

## RF 15 short-travel keyswitch, non-illuminated



Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Ag	not illuminated	transparent			<b>3.14.100.006/0000</b>
Au	not illuminated	transparent			<b>3.14.100.001/0000</b>

Technical data see page 4 - 26

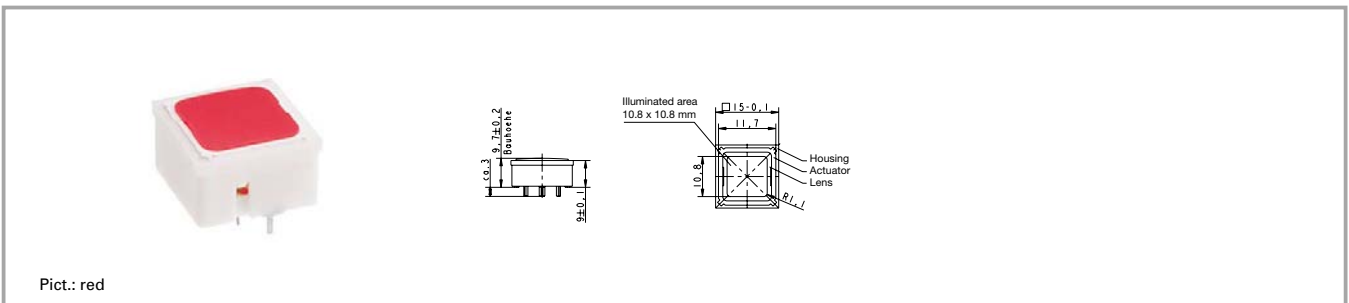
**Accessories:**

Keycap for RF 15, snap-on, for overall height 12.5 mm: 5.46.654.059/0227

For keycaps, refer to chapter accessories and system RK 90.

If exchangeable legends are required, or if an overall height of 12.5 mm is required, a keycap can be mounted on the non-illuminated keys. The keycap legend is visible through a window in the overlay. You can change the legend by replacing the keycap.

## RF 15 short-travel keyswitch, fully illuminated with 2 LEDs



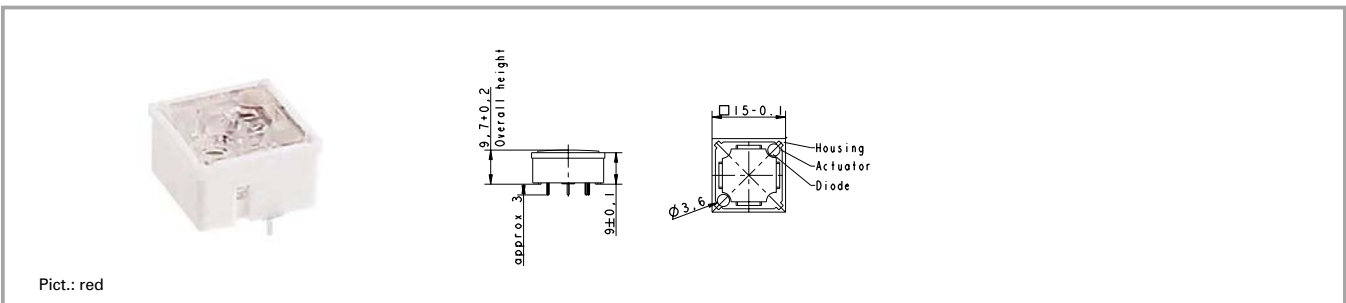
Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Ag	fully illuminated 2 LEDs	red	red	2 mm	<b>3.14.200.021/0000</b>
Ag	fully illuminated 2 LEDs	green	green	2 mm	<b>3.14.200.022/0000</b>
Ag	fully illuminated 2 LEDs	yellow	yellow	2 mm	<b>3.14.200.023/0000</b>
Ag	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.200.024/0000
Ag	fully illuminated 2 LEDs	blue	blue	2 mm	3.14.200.025/0000
Au	fully illuminated 2 LEDs	green	green	2 mm	<b>3.14.200.012/0000</b>
Au	fully illuminated 2 LEDs	yellow	yellow	2 mm	<b>3.14.200.013/0000</b>
Au	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.200.014/0000
Au	fully illuminated 2 LEDs	blue	blue	2 mm	3.14.200.015/0000

Technical data see page 4 - 26

For keycaps, refer to RK 90 system design.

Technical data of LED see separate page at the beginning of this chapter.

## RF 15 short-travel keyswitch, 1 LED spot-illumination



Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Ag	spot illumination 1 LED	opaque white	blue	3 mm	3.14.100.040/0000
Ag	spot illumination 1 LED	transparent	red	3 mm	<b>3.14.100.041/0000</b>
Ag	spot illumination 1 LED	transparent	green	3 mm	<b>3.14.100.042/0000</b>
Ag	spot illumination 1 LED	transparent	yellow	3 mm	<b>3.14.100.043/0000</b>
Au	spot illumination 1 LED	opaque white	blue	3 mm	3.14.100.030/0000
Au	spot illumination 1 LED	transparent	red	3 mm	<b>3.14.100.031/0000</b>
Au	spot illumination 1 LED	transparent	green	3 mm	<b>3.14.100.032/0000</b>
Au	spot illumination 1 LED	transparent	yellow	3 mm	<b>3.14.100.033/0000</b>

Technical data see page 4 - 26

Double-spot LED illumination available on request  
 Technical data of LED see separate page at the beginning of this chapter.



## RF 15 N short-travel keyswitch



### General data

The RF 15N keyswitch provides a minimum overall height of 6.2 mm. The overall height can be varied by extension plungers which are inserted into the cross-like notches on the actuator tops.

LEDs can only be arranged separately next to the keyswitches up to an overall height of 10 mm (i.e. without plunger or with small plunger).

Keyswitches with overall heights of 12 mm or more can be provided with a maximum of 2 LEDs which are inserted into the recesses of the keyswitch housing. LEDs of keyswitches with overall heights of 12.5 mm or more should be placed onto LED spacers in order to obtain satisfactory illumination.

### Technical data

#### General information

Colour of lens see order block  
Recommended key grid 19.05 mm

#### Dimensions

Length 15 mm  
Width 15 mm  
Overall height 6.2 mm

#### Mechanical design

Mounting soldering into PCB  
Terminals contacts tin-plated, fix contact Ag plated  
Contact system snap-action contact  
Contact arrangement 1 NO  
Contact materials Au/Ag  
Illumination external 3 mm LED possible if height < 12 mm

#### Mechanical characteristics

Operating force max. 2 ... 3 N  
Operating travel 0.5 mm  
Switching travel 0.5 mm  
Robustness min. with through-plated PCB 100 N

#### Electrical characteristics

Rated voltage min. Au: 0.02 V, Ag: 3 V  
Rated voltage max. Au: 42 V, Ag: 50 V  
Rated current min. Au: 0,01 mA, Ag: 0,1 mA  
Rated current max. Au: 100 mA, Ag: 250 mA  
Rated power max. (ohmic load) Au: 2 W, Ag: 12.5 W

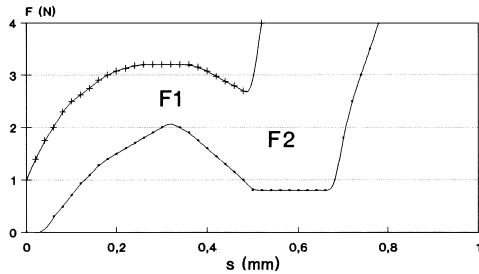
Contact resistance when new max. 100 mΩ  
Contact resistance acc. to life max. 3 Ω  
Insulation resistance 10<sup>9</sup> Ω  
ESD strength (underneath overlay) 15 kV  
Bouncing time max. 5 ms

#### Other specifications

Ambient temp. operating min. -25 °C  
Ambient temp. operating max. +70 °C  
Storage temperature min. -40 °C  
Storage temperature max. (product) +80 °C  
Storage temperature max. (in tube) +50 °C  
Resistance to constant environment according to IEC 600 68-2-3 and 2-30  
Resistance at variable environment according to IEC 600 68-2-14 and 2-33  
Operating life min. 1,000,000  
Soldering time max. 2,5 sec.  
Soldering temperature max. 250 °C  
Flammability of materials UL 94 HB

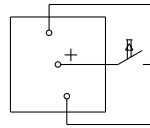
## Force/Travel Diagram – Keyswitch RF 15 N

Operation characteristic limits RF

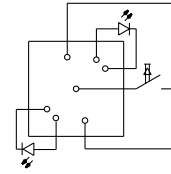


F 1 = Max. operating force  
F 2 = Force at contact  
F 2 is max. 55% of F 1

## Circuit Diagram – Keyswitch RF 15 N

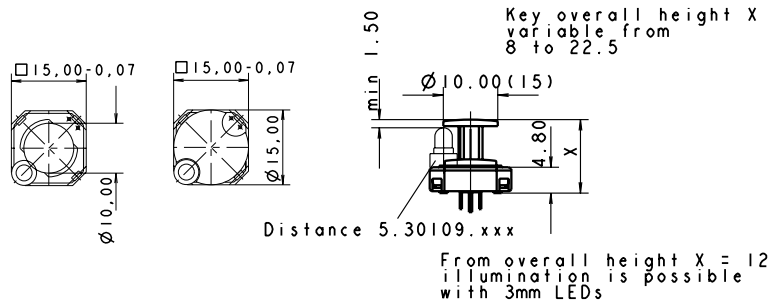


Keyswitch,  
non illuminated



Keyswitch,  
spot-illuminated

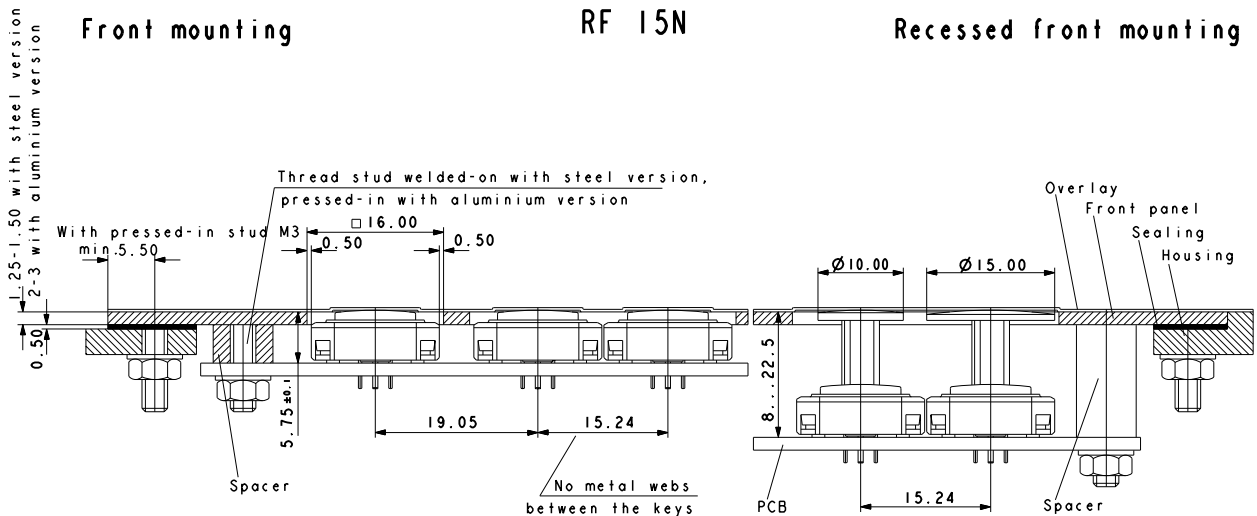
## Dimensional Drawings RF 15 N



### Front mounting

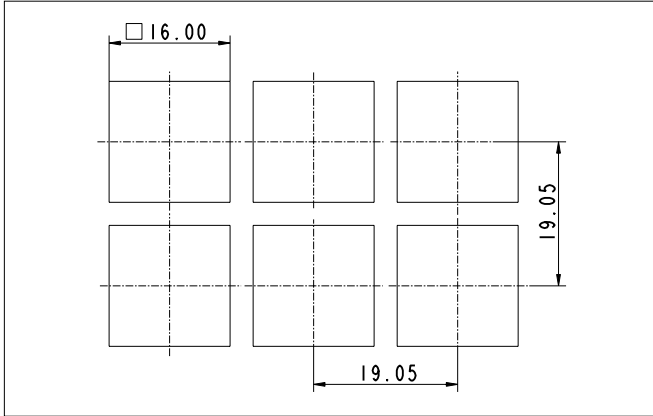
### RF 15N

### Recessed front mounting

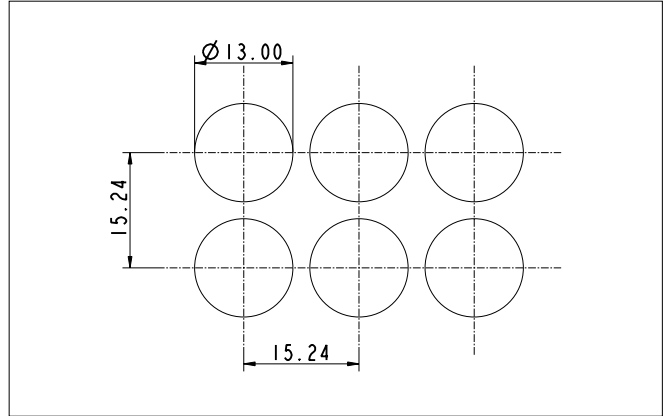


**Hole Patterns – Front Panel RF 15 N**

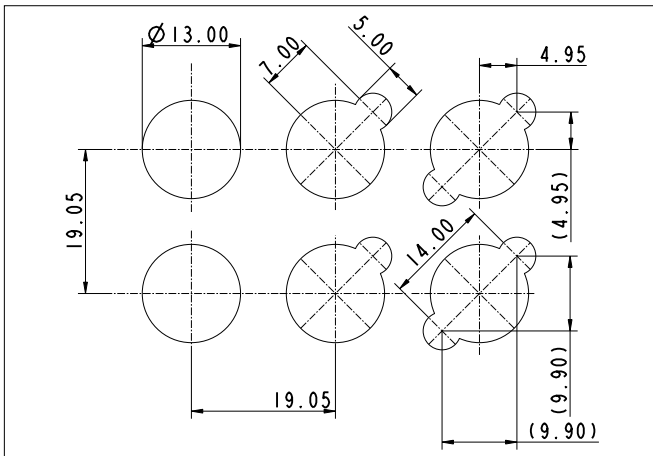
RF 15 N without plunger



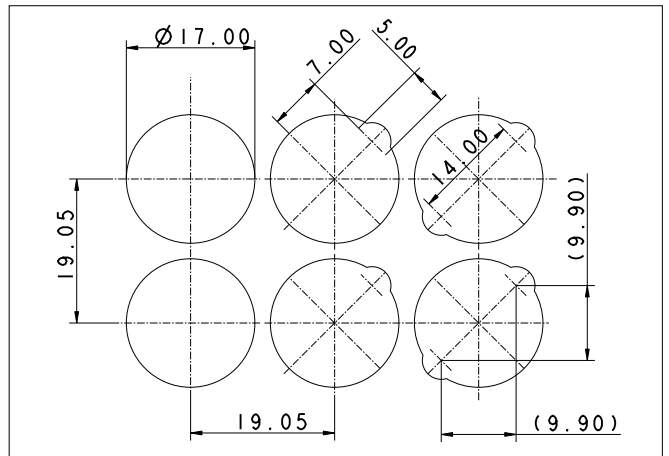
RF 15 N with plunger  $\varnothing$  10 mm, non-illuminated



RF 15 N with plunger  $\varnothing$  10 mm, illuminated

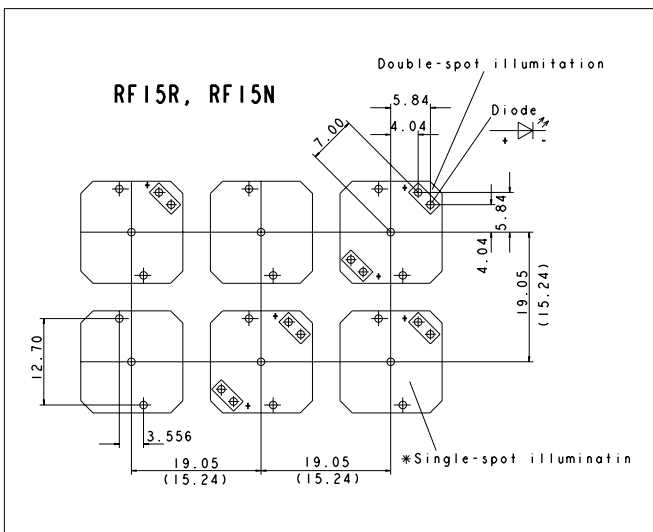


RF 15 N with plunger  $\varnothing$  15 mm, illuminated



4

**Hole Pattern RF 15 N**



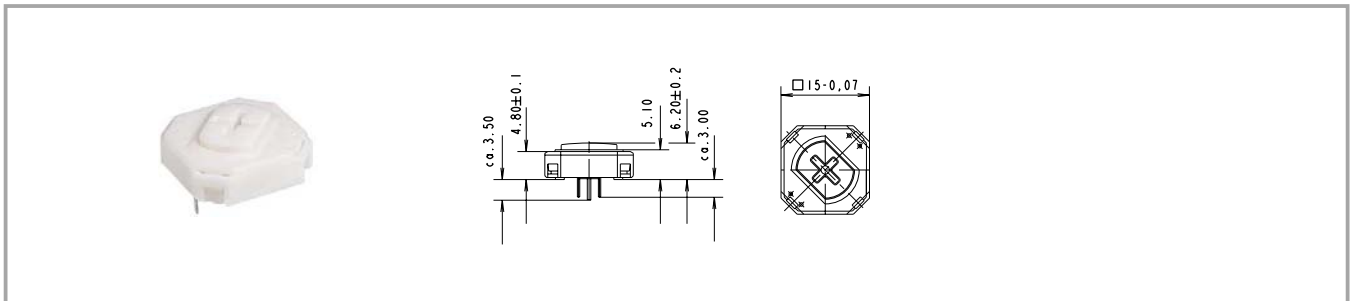
View on component side  
All hole diameters  $1,1 \pm 0,1$  mm  
PCB layout Keyswitch 1/400" grid

RF

## Accessories RF 15 N short-travel keyswitch

Description	Photo	Order no.	Page
LED yellow, 3mm		1.90.690.103/0000	5 - 20
LED spacer for RF 15 N, Ø 5 mm, spacing length 2.2 mm, light grey, for use with overall height of 12.5 mm		5.30.109.010/0756	
Extension plunger for RF 15 N, Ø 10 mm, overall height 22.5 mm		<b>5.46.011.028/0710</b>	
Extension plunger for RF 15 N, Ø 15 mm, overall height 22.5 mm		<b>5.46.017.028/0710</b>	

## RF 15 N short-travel keyswitch, non-illuminated



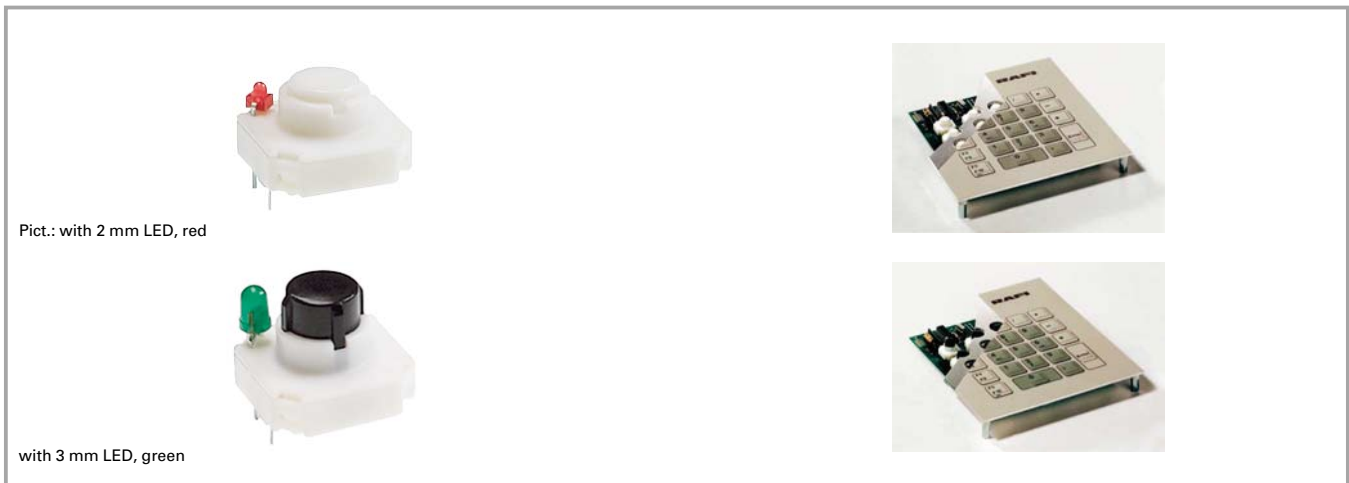
Contact materials	Illumination	Recommended key grid	Overall height	Order no.
Au	external 3 mm LED possible if height < 12 mm	19.05 mm	6.2 mm	<b>3.14.100.601/0000</b>
Ag	external 3 mm LED possible if height < 12 mm	19.05 mm	6.2 mm	<b>3.14.100.606/0000</b>

Technical data see page 4 - 32

For keycaps, refer to RK 90 system design.

Double-spot LED illumination available on request.

## RF 15 R short-travel keyswitch



### General data

The round actuator of the RF 15 R keyswitch requires round front panel cut-outs. These make it possible to use a narrow keyboard grid of only 15.24 mm with sufficiently large frame webs between the individual keys. We recommend area embossing over the actuators for the overlay.

### Technical data

#### General information

Recommended key grid 15.24 mm

#### Dimensions

Length 15 mm  
Width 15 mm  
Overall height 9,7/12,5 mm

#### Mechanical design

Mounting soldering into PCB  
Terminals contacts tin-plated, fix contact Ag plated  
Contact system snap-action contact  
Contact arrangement 1 NO  
Contact materials Au/Ag  
Illumination spot illumination  
LED colour see order block  
LED type see order block

#### Mechanical characteristics

Operating force max. 2 ... 3 N  
Operating travel 0.5 mm  
Switching travel 0.5 mm  
Robustness min. with through-plated PCB 100 N

#### Electrical characteristics

Rated voltage min. Au: 0.02 V, Ag: 3 V  
Rated voltage max. Au: 42 V, Ag: 50 V  
Rated current min. Au: 0,01 mA, Ag: 0,1 mA  
Rated current max. Au: 100 mA, Ag: 250 mA  
Rated power max. (ohmic load) Au: 2 W, Ag: 12.5 W

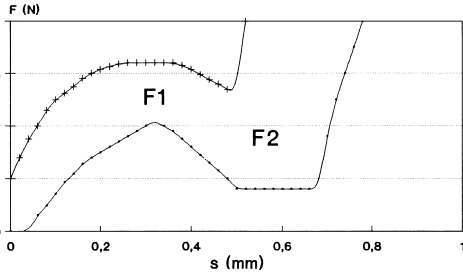
Contact resistance when new max. 100 mΩ  
Contact resistance acc. to life max. 3 Ω  
Insulation resistance 10<sup>9</sup> Ω  
ESD strength (underneath overlay) 15 kV  
Bouncing time max. 5 ms

#### Other specifications

Ambient temp. operating min. -25 °C  
Ambient temp. operating max. +70 °C  
Storage temperature min. -40 °C  
Storage temperature max. (product) +80 °C  
Storage temperature max. (in tube) +50 °C  
Resistance to constant environment according to IEC 600 68-2-3 and 2-30  
Resistance at variable environment according to IEC 600 68-2-14 and 2-33  
Operating life min. 1,000,000  
Soldering time max. 2,5 sec.  
Soldering temperature max. 250 °C  
Flammability of materials UL 94 HB

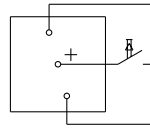
## Force/Travel Diagram – Keyswitch RF 15 R

Operation characteristic limits RF

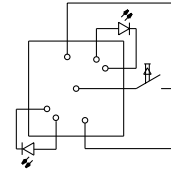


F 1 = Max. operating force  
F 2 = Force at contact  
F 2 is max. 55% of F 1

## Circuit Diagram – Keyswitch RF 15 R

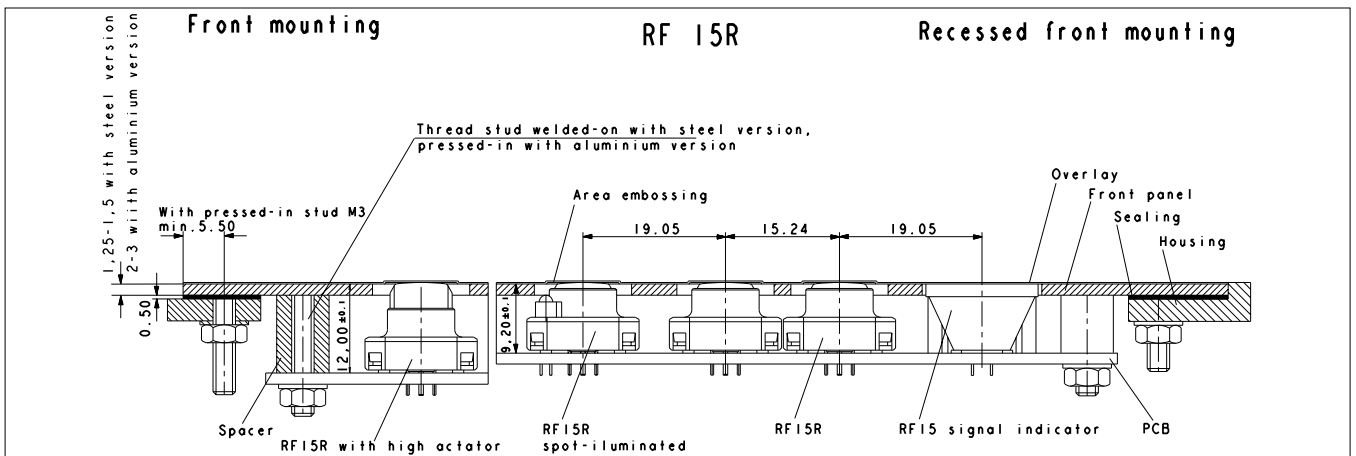


Keyswitch,  
non-illuminated

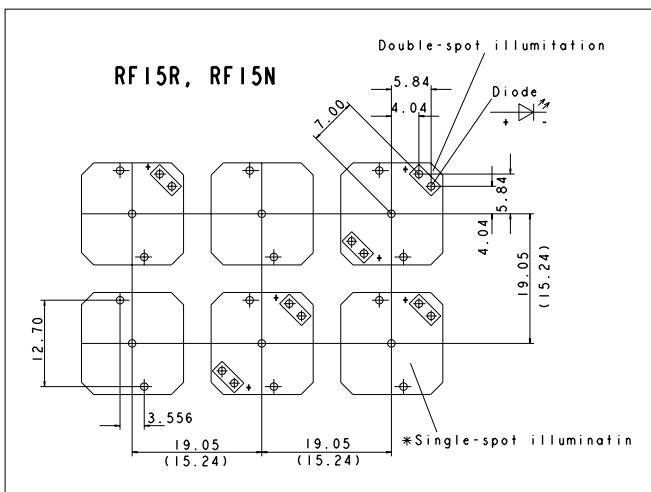


Keyswitch,  
spot-illuminated

## Dimensional Drawing RF 15 R



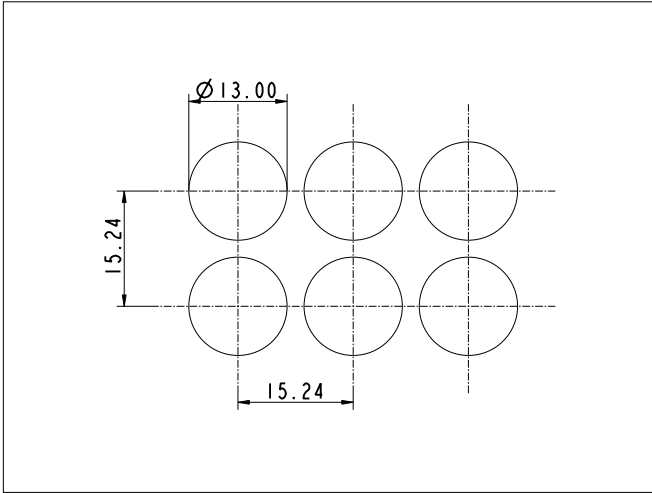
## Hole Pattern RF 15 R



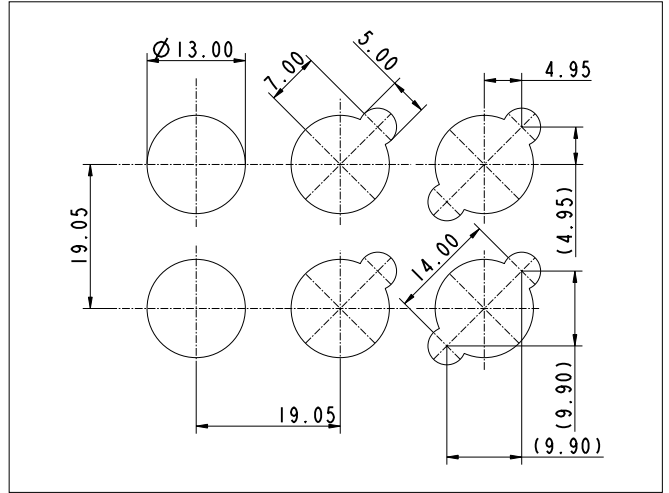
View on component side  
All hole diameters 1,1  $\pm$  0,1 mm  
PCB layout Keyswitch 1/400" grid

## Hole Pattern – Front Panel RF 15 R

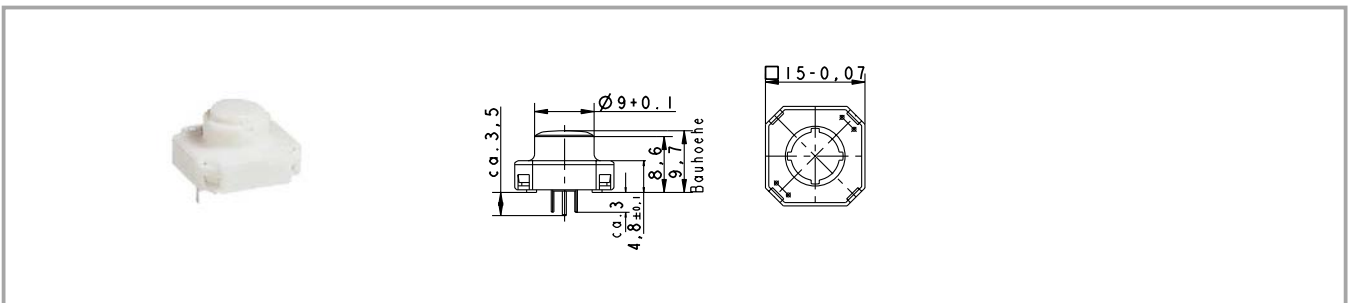
RF 15 R, non-illuminated



RF 15 R, illuminated



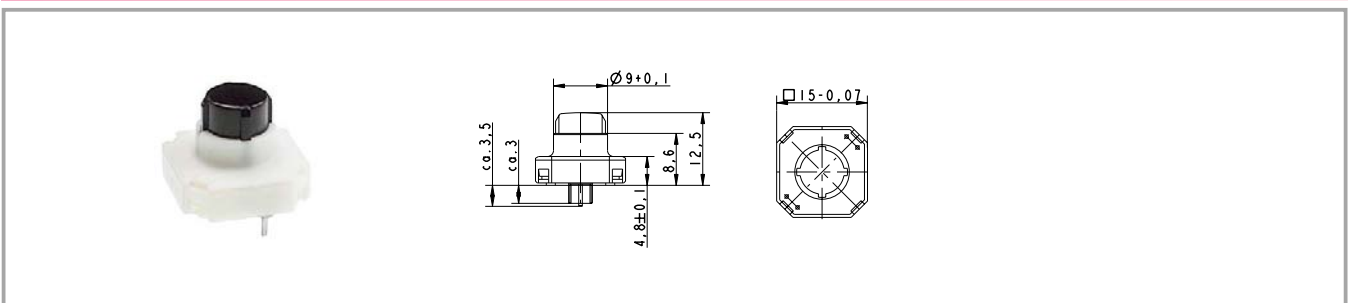
**RF 15 R low short-travel keyswitch, non-illuminated**



Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	9.7 mm	not illuminated			<b>3.14.100.501/0000</b>
Ag	9.7 mm	not illuminated			<b>3.14.100.506/0000</b>

Technical data see page 4 - 36

**RF 15 R high short-travel keyswitch, non-illuminated**



Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	12.5 mm	not illuminated			<b>3.14.100.801/0000</b>
Ag	12.5 mm	not illuminated			<b>3.14.100.806/0000</b>

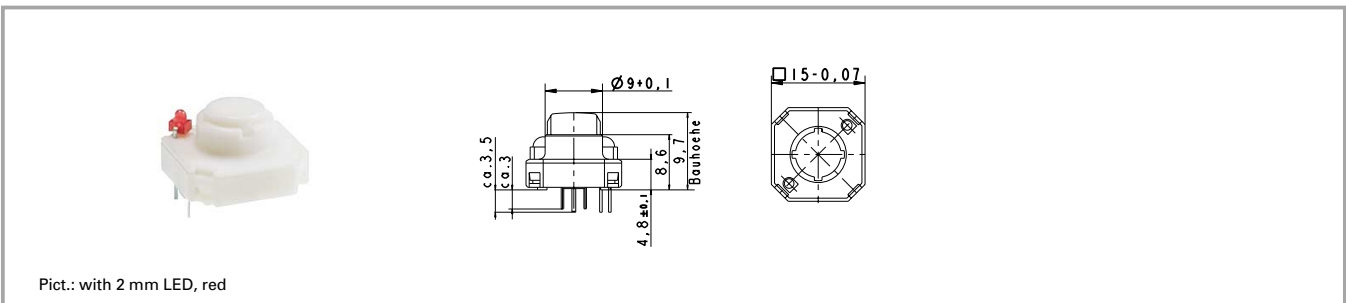
Technical data see page 4 - 36

4

RF



## RF 15 R low short-travel keyswitch, 1 LED spot-illumination



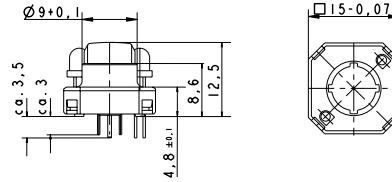
Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	9.7 mm	spot illumination 1 LED	2 mm	red	<b>3.14.100.531/0000</b>
Au	9.7 mm	spot illumination 1 LED	2 mm	green	<b>3.14.100.532/0000</b>
Au	9.7 mm	spot illumination 1 LED	2 mm	yellow	<b>3.14.100.533/0000</b>
Ag	9.7 mm	spot illumination 1 LED	2 mm	red	3.14.100.541/0000
Ag	9.7 mm	spot illumination 1 LED	2 mm	green	3.14.100.542/0000
Ag	9.7 mm	spot illumination 1 LED	2 mm	yellow	3.14.100.543/0000

Technical data see page 4 - 36

Versions with 2 LEDs available on request.

Technical data of LED see separate page at the beginning of this chapter.

## RF 15 R high short-travel keyswitch, 1 LED spot-illumination



Pict.: with 3 mm LED, green

Contact materials	Overall height	Illumination	LED type	LED colour	Order no.
Au	12.5 mm	spot illumination 1 LED	3 mm	blue	3.14.100.830/0000
Au	12.5 mm	spot illumination 1 LED	3 mm	red	3.14.100.831/0000
Au	12.5 mm	spot illumination 1 LED	3 mm	green	3.14.100.832/0000
Au	12.5 mm	spot illumination 1 LED	3 mm	yellow	3.14.100.833/0000
Ag	12.5 mm	spot illumination 1 LED	3 mm	blue	3.14.100.840/0000
Ag	12.5 mm	spot illumination 1 LED	3 mm	red	3.14.100.841/0000
Ag	12.5 mm	spot illumination 1 LED	3 mm	green	3.14.100.842/0000
Ag	12.5 mm	spot illumination 1 LED	3 mm	yellow	3.14.100.843/0000

Technical data see page 4 - 36

Versions with 2 LEDs available on request.

Technical data of LED see separate page at the beginning of the chapter.

## RF 15 H short-travel keyswitch



### General data

#### Application notes:

The RF 15 H key has an overall height of 12.5 mm and can be fully illuminated. When designing membrane keyboards, we recommend using a key grid of at least 19.05 mm and a 0.13 mm overlay with area embossing over the keys. You can use the O-ring (accessory) to block the key and use it as an indicator field or blank spaceholder.

### Technical data

#### General information

Colour of lens see order block  
 Recommended key grid 20 mm

#### Dimensions

Length 15 mm  
 Width 15 mm  
 Overall height 12.5 mm

#### Mechanical design

Mounting soldering into PCB  
 Terminals see order block  
 Contact system snap-action contact  
 Contact arrangement 1 NO  
 Contact materials Au/Ag  
 Illumination not illuminated / fully illuminated  
 LED colour see order block  
 LED type see order block

#### Mechanical characteristics

Operating force max. 2 ... 3 N  
 Operating travel 0.5 mm  
 Switching travel 0.5 mm  
 Robustness min. with through-plated PCB 100 N

#### Electrical characteristics

Rated voltage min. Au: 0.02 V, Ag: 3 V  
 Rated voltage max. Au: 42 V, Ag: 50 V  
 Rated current min. Au: 0,01 mA, Ag: 0,1 mA  
 Rated current max. Au: 100 mA, Ag: 250 mA

Rated power max. (ohmic load) Au: 2 W, Ag: 12.5 W  
 Contact resistance when new max. 100 mΩ  
 Contact resistance acc. to life max. 3 Ω  
 Insulation resistance 10<sup>9</sup> Ω  
 ESD strength (underneath overlay) 15 kV  
 Bouncing time max. 5 ms

#### Other specifications

Ambient temp. operating min. -25 °C  
 Ambient temp. operating max. +70 °C  
 Storage temperature min. -40 °C  
 Storage temperature max. (product) +80 °C  
 Storage temperature max. (in tube) +50 °C  
 Resistance to constant environment according to IEC 600 68-2-3 and 2-30  
 Resistance at variable environment according to IEC 600 68-2-14 and 2-33  
 Operating life min. 1,000,000  
 Soldering time max. 2,5 sec.  
 Soldering temperature max. 250 °C  
 Flammability of materials UL 94 HB

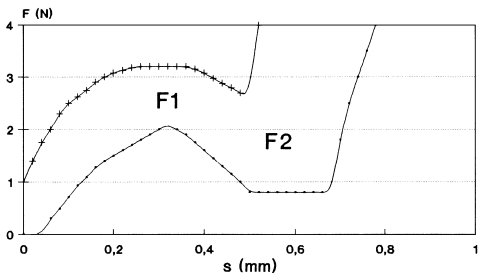
4

RF

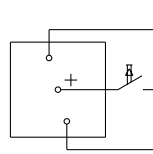
## Force/Travel Diagram – Keyswitch RF 15 H

## Circuit Diagram – Keyswitch RF 15 H

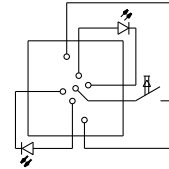
Operation characteristic limits RF



F 1 = Max. operating force  
 F 2 = Force at contact  
 F 2 is max. 55% of F 1

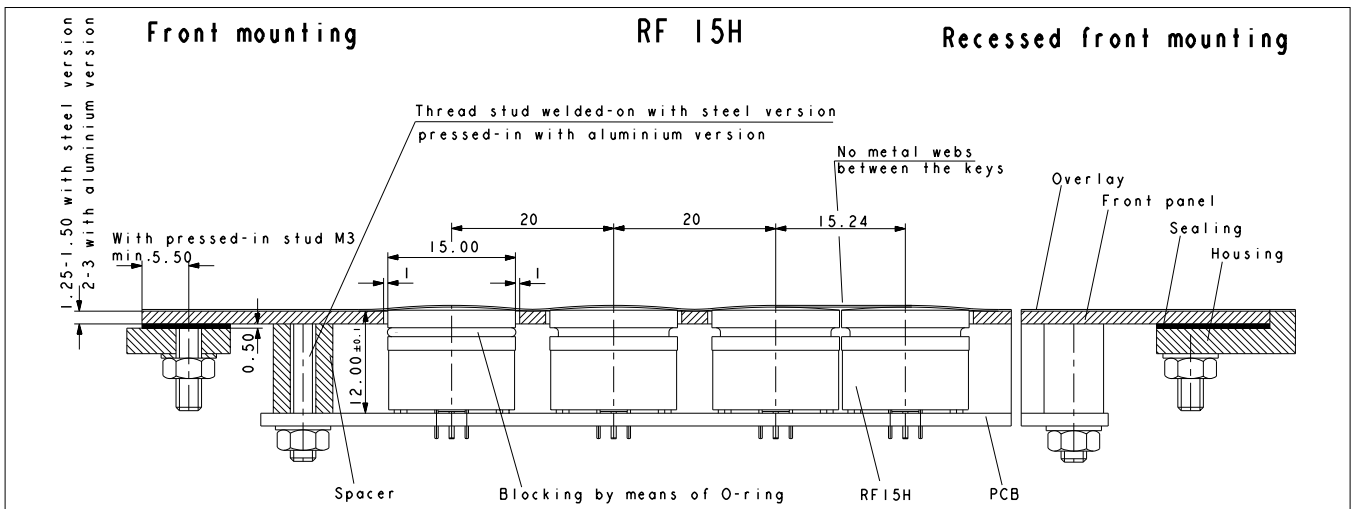


Keyswitch, non-illuminated



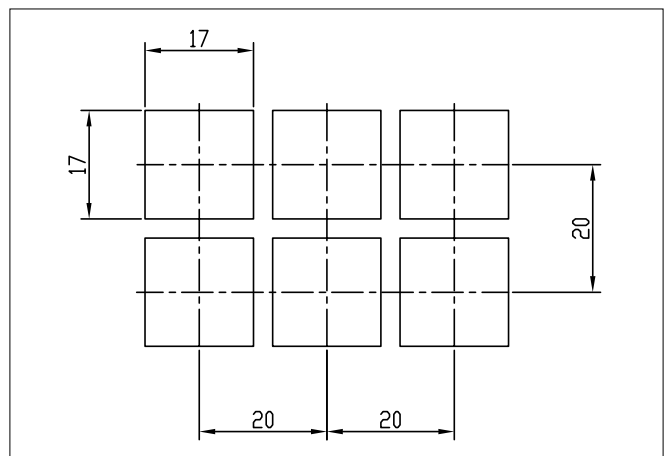
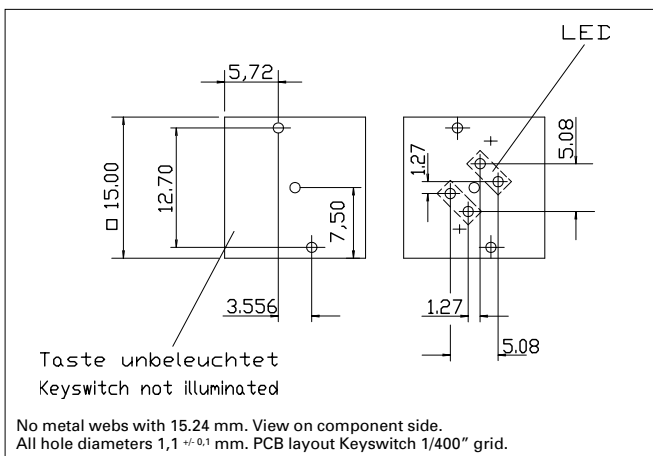
Keyswitch, fully illuminated

## Dimensional Drawing



## Hole Pattern

## Hole Pattern – Front Panel



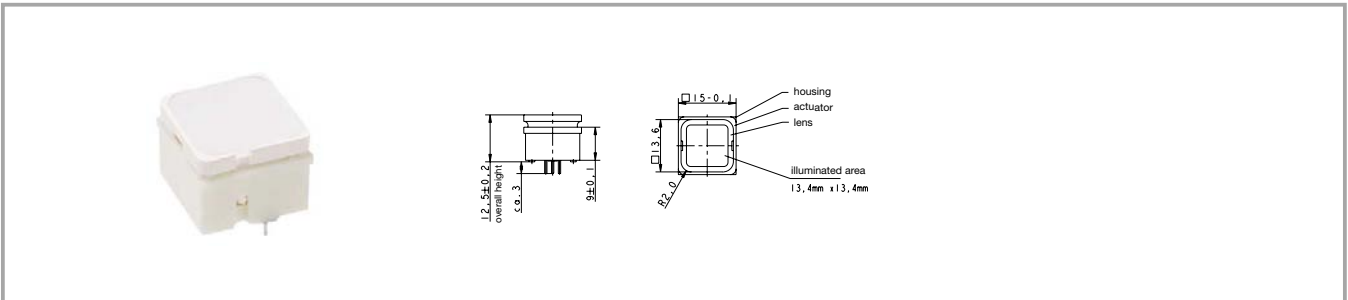
4

RF

## Accessories RF 15 H short-travel keyswitch

Description	Photo	Order no.	Page
O-ring, black, for blocking the operating stroke		<b>5.30.120.009/0100</b>	5 - 27

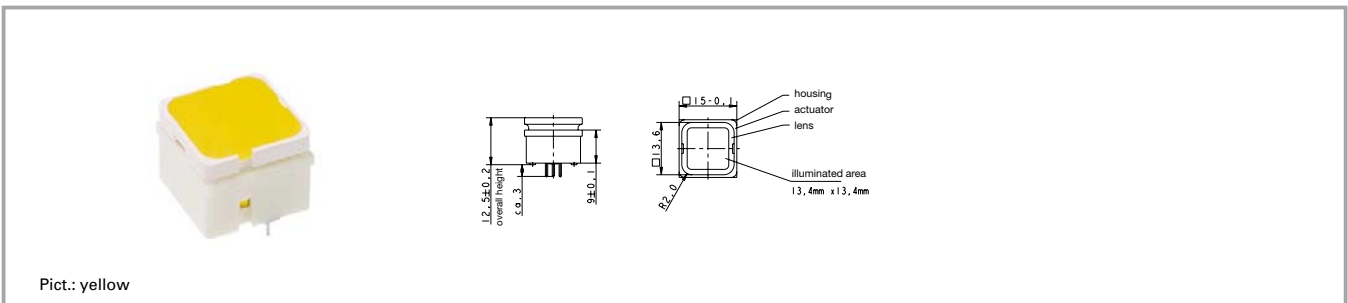
## RF 15 H short-travel keyswitch, non-illuminated



Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	not illuminated	white			<b>3.14.100.702/0000</b>
Ag	not illuminated	white			<b>3.14.100.707/0000</b>

Technical data see page 4 - 42

## RF 15 H short-travel keyswitch, fully illuminated



Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	fully illuminated 2 LEDs	red	red	2 mm	<b>3.14.200.731/0000</b>
Au	fully illuminated 2 LEDs	green	green	2 mm	<b>3.14.200.732/0000</b>
Au	fully illuminated 1 LED	green	green super bright	3 mm	<b>3.14.200.736/0000</b>
Au	fully illuminated 2 LEDs	yellow	yellow	2 mm	<b>3.14.200.733/0000</b>
Au	fully illuminated 1 LED	white	white	3 mm	<b>3.14.200.735/0000</b>
Au	fully illuminated 2 LEDs	orange	yellow	2 mm	<b>3.14.200.738/0000</b>
Au	fully illuminated 1 LED	blue	blue	3 mm	<b>3.14.200.739/0000</b>
Au	fully illuminated 2 LEDs	white	multi colour	3 mm	3.14.100.734/0000
Ag	fully illuminated 2 LEDs	red	red	2 mm	<b>3.14.200.741/0000</b>
Ag	fully illuminated 2 LEDs	green	green	2 mm	<b>3.14.200.742/0000</b>
Ag	fully illuminated 1 LED	green	green super bright	3 mm	<b>3.14.200.746/0000</b>
Ag	fully illuminated 2 LEDs	yellow	yellow	2 mm	<b>3.14.200.743/0000</b>
Ag	fully illuminated 1 LED	white	white	3 mm	<b>3.14.200.745/0000</b>
Ag	fully illuminated 2 LEDs	orange	yellow	2 mm	<b>3.14.200.748/0000</b>
Ag	fully illuminated 1 LED	blue	blue	3 mm	<b>3.14.200.749/0000</b>
Ag	fully illuminated 2 LEDs	white	multi colour	3 mm	3.14.100.744/0000

Technical data see page 4 - 42

When using the keyswitches with multicolour LEDs the illumination colour can be varied from red to green by change of polarity. Due to the frequency of the polarity-changes the colours red, green, yellow as well as all secondary colours from these are possible. Technical data of LED see separate page of the beginning of this chapter.

**RF 15 signal indicator**



Pict.: green

**Technical data**

**General information**

Colour of lens see order block  
Recommended key grid 19.05 mm

**Dimensions**

Length 15 mm  
Width 15 mm  
Overall height 9.7 mm

**Mechanical design**

Mounting soldering into PCB  
Illumination fully illuminated 1 LED  
LED colour see order block  
LED type 2 mm

**Other specifications**

Ambient temp. operating min. -25 °C

Ambient temp. operating max.

+70 °C

Storage temperature min.

-40 °C

Storage temperature max. (product)

+80 °C

Storage temperature max. (in tube)

+50 °C

Resistance to constant environment

according to IEC 600 68-2-3 and 2-30

Resistance at variable environment

according to IEC 600 68-2-14 and 2-33

Soldering time max.

2,5 sec.

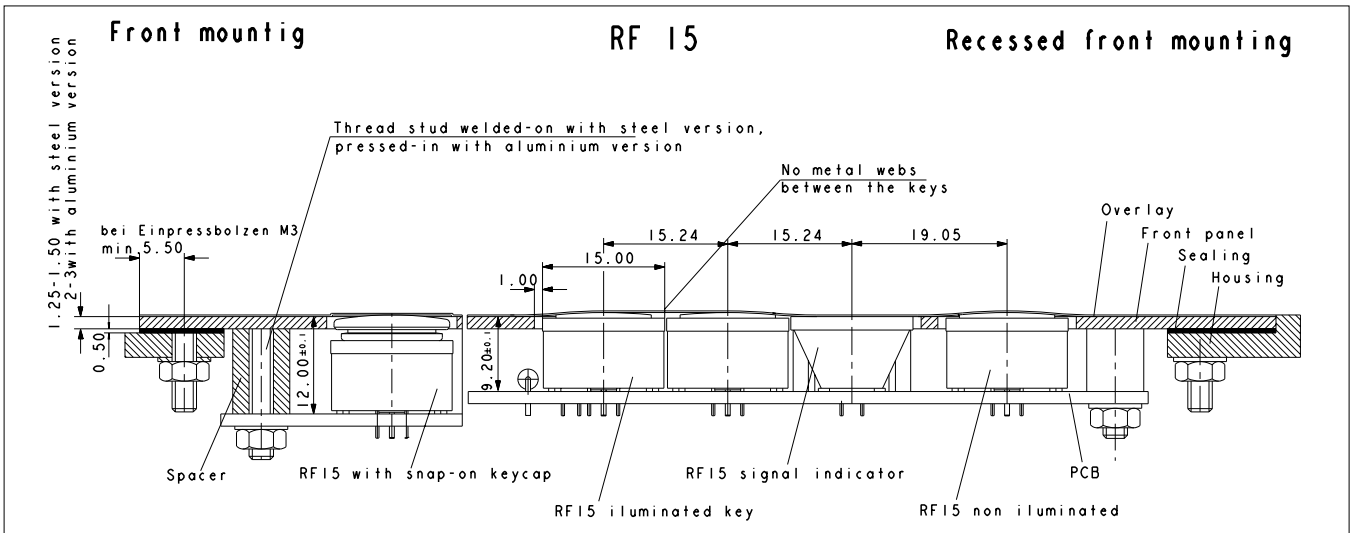
Soldering temperature max.

250 °C

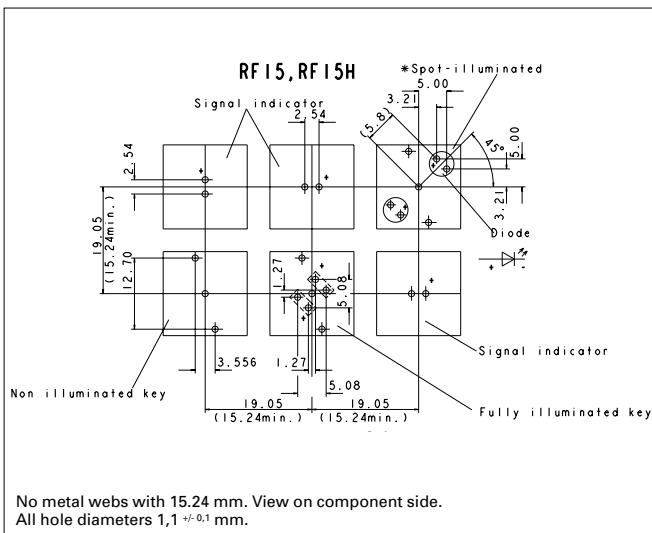
Flammability of materials

UL 94 HB

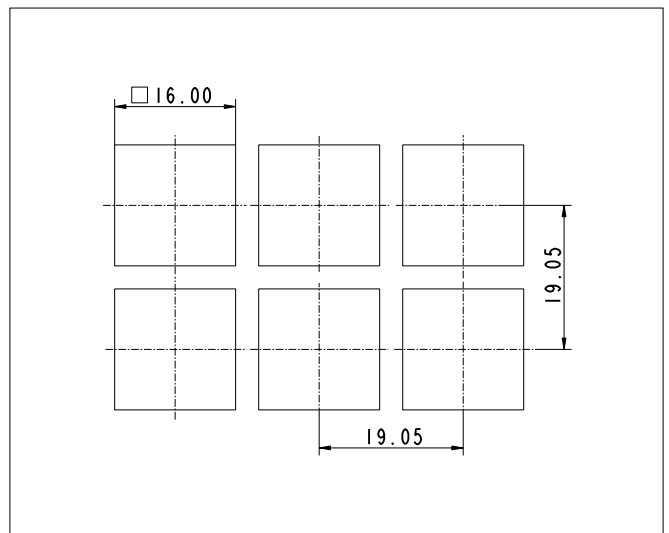
## Dimensional Drawing Signal Indicator RF 15



### Hole Pattern



### Hole Pattern – Front Panel

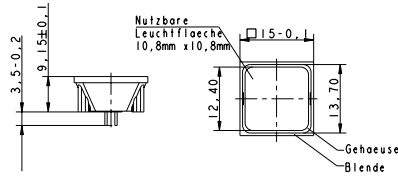




## RF 15 signal indicator, fully illuminated, 1 LED



Pict.: green



Overall height	Illumination	Colour of lens	LED colour	LED type	Order no.
9.7 mm	fully illuminated 1 LED	red	red	2 mm	<b>3.14.200.051/0000</b>
9.7 mm	fully illuminated 1 LED	green	green	2 mm	<b>3.14.200.052/0000</b>
9.7 mm	fully illuminated 1 LED	yellow	yellow	2 mm	<b>3.14.200.053/0000</b>
9.7 mm	fully illuminated 1 LED	orange	yellow	2 mm	3.14.200.054/0000
9.7 mm	fully illuminated 1 LED	blue	blue	2 mm	3.14.200.055/0000

Technical data see page 4 - 46

For more information, see LEDs.

Technical data of LED see separate page of the beginning of this chapter.

## RF 19 short-travel keyswitch



### General data

#### Application notes:

RF 19 keys offer a large actuation area. When designing low-profile keyboards with a grid of  $\geq 23$  mm, frame webs remain free between the individual keys.

The overlay can be glued onto these frame webs; we recommend area embossing over the keys for the overlay.

### Technical data

#### General information

Colour of lens see order block  
Recommended key grid 23 mm

#### Dimensions

Length 19.05 mm  
Width 19.05 mm  
Overall height 9.7 mm

#### Mechanical design

Mounting soldering into PCB  
Terminals contacts tin-plated, fix contact Ag plated snap-action contact

Contact system 1 NO  
Contact arrangement Au/Ag  
Contact materials spot-/fully illuminated  
Illumination see order block  
LED colour see order block  
LED type

#### Mechanical characteristics

Operating force max. 2 ... 3 N  
Operating travel 0.5 mm  
Switching travel 0.5 mm  
Robustness min. with through-plated PCB 100 N

#### Electrical characteristics

Rated voltage min. Au: 0.02 V, Ag: 3 V  
Rated voltage max. Au: 42 V, Ag: 50 V  
Rated current min. Au: 0,01 mA, Ag: 0,1 mA  
Rated current max. Au: 100 mA, Ag: 250 mA

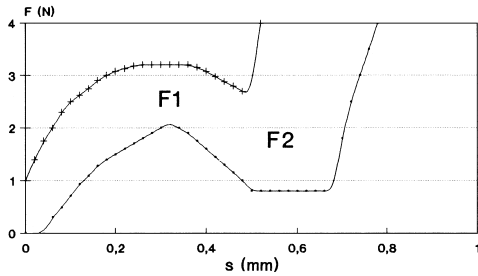
Rated power max. (ohmic load) Au: 2 W, Ag: 12.5 W  
Contact resistance when new max. 100 m $\Omega$   
Contact resistance acc. to life max. 3  $\Omega$   
Insulation resistance 10<sup>9</sup>  $\Omega$   
ESD strength (underneath overlay) 15 kV  
Bouncing time max. 5 ms

#### Other specifications

Ambient temp. operating min. -25 °C  
Ambient temp. operating max. +70 °C  
Storage temperature min. -40 °C  
Storage temperature max. (product) +80 °C  
Storage temperature max. (in tube) +50 °C  
Resistance to constant environment according to IEC 600 68-2-3 and 2-30  
Resistance at variable environment according to IEC 600 68-2-14 and 2-33  
Operating life min. 1,000,000  
Soldering time max. 2,5 sec.  
Soldering temperature max. 250 °C  
Flammability of materials UL 94 HB

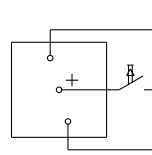
## Force/Travel Diagram – Keyswitch RF 19

Operation characteristic limits RF

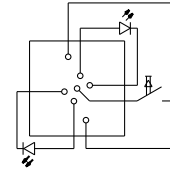


F 1 = Max. operating force  
F 2 = Force at contact  
F 2 is max. 55% of F 1

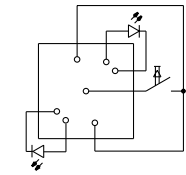
## Circuit Diagram – Keyswitch RF 19



Keyswitch, non-illuminated

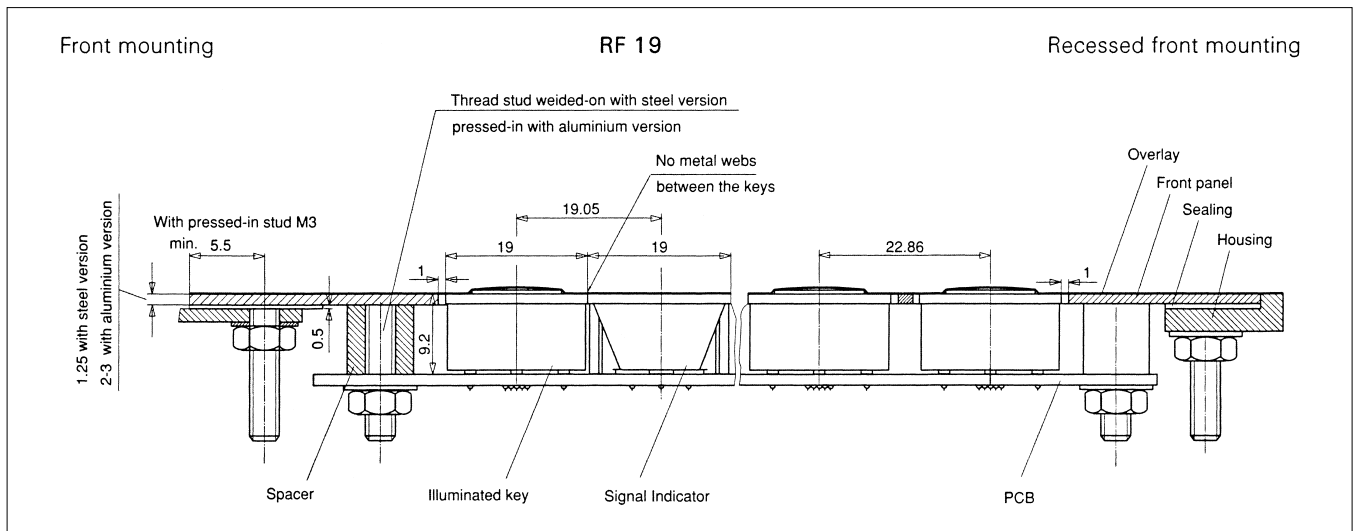


Keyswitch, fully illuminated

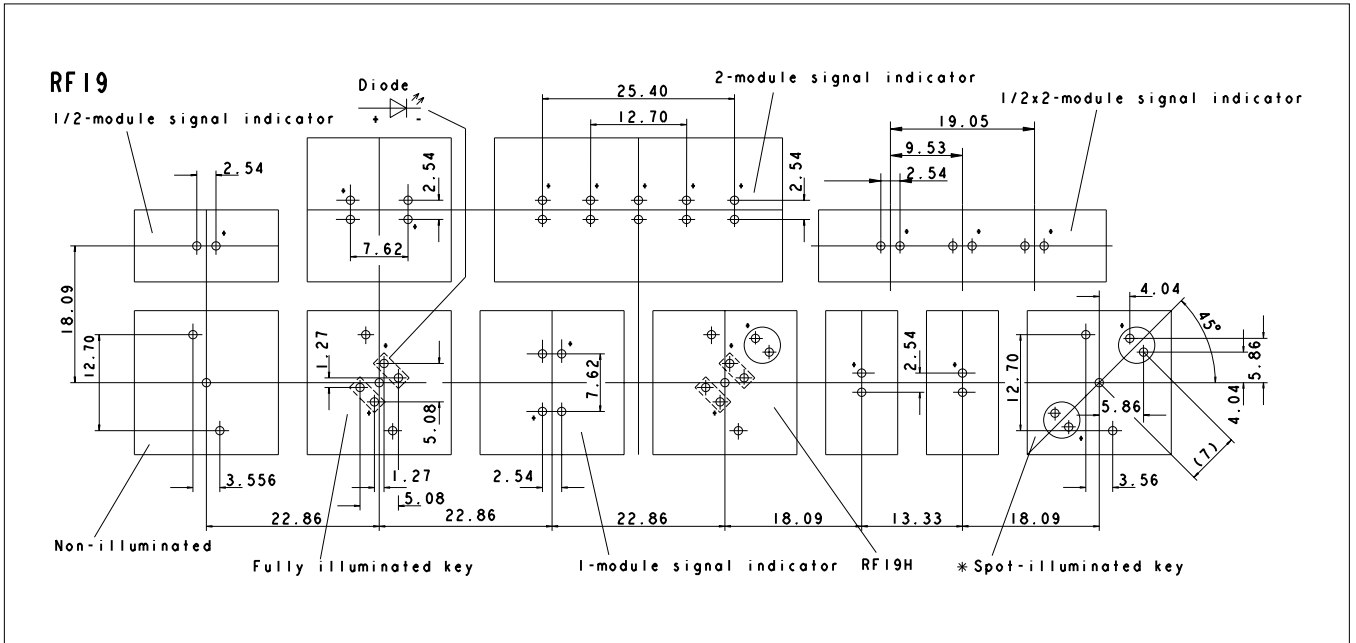


Keyswitch, spot-illuminated

## Dimensional Drawing



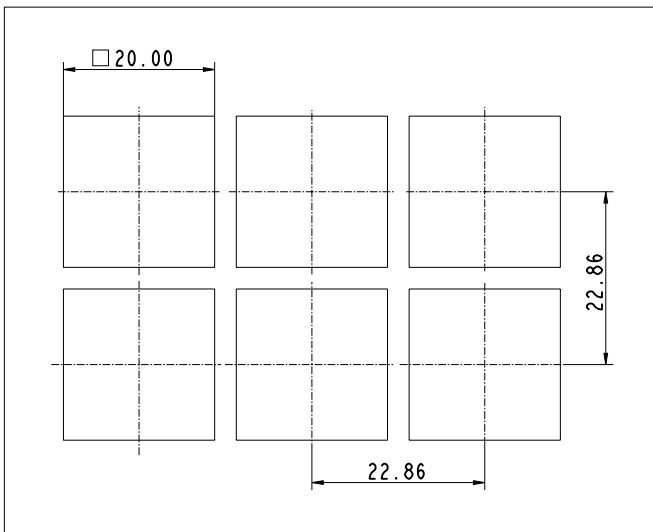
Hole Patterns RF 19



\* The LED may be positioned either on the left-hand or right-hand side.  
Standard version: LED on left-hand side  
View on component side, all hole diameters 1,1 +/- 0,1 mm

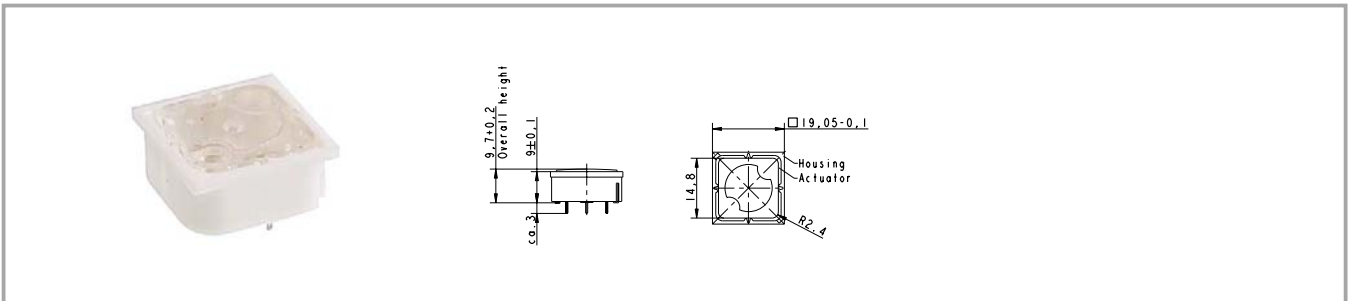
Hole Patterns – Front Panel RF 19

4



RF

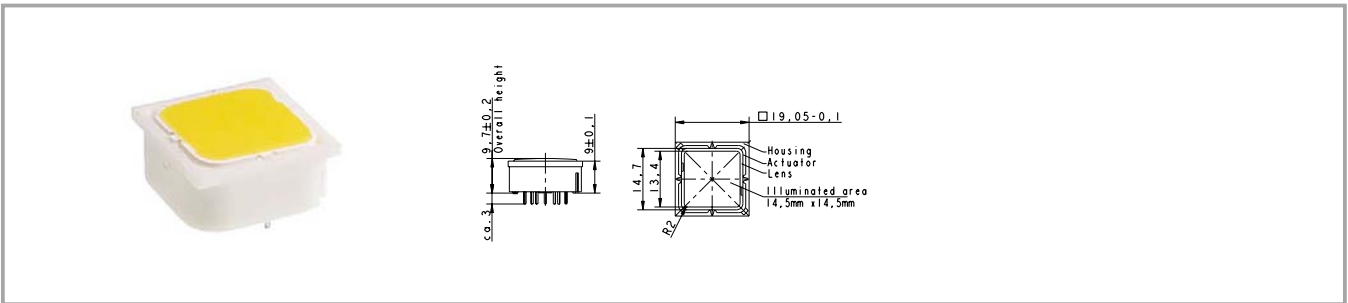
**RF 19 short-travel keyswitch, non-illuminated**



Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	not illuminated	transparent			<b>3.14.001.001/0000</b>
Ag	not illuminated	transparent			<b>3.14.001.006/0000</b>

Technical data see page 4 - 50

## RF 19 short-travel keyswitch, fully illuminated with 2 LEDs

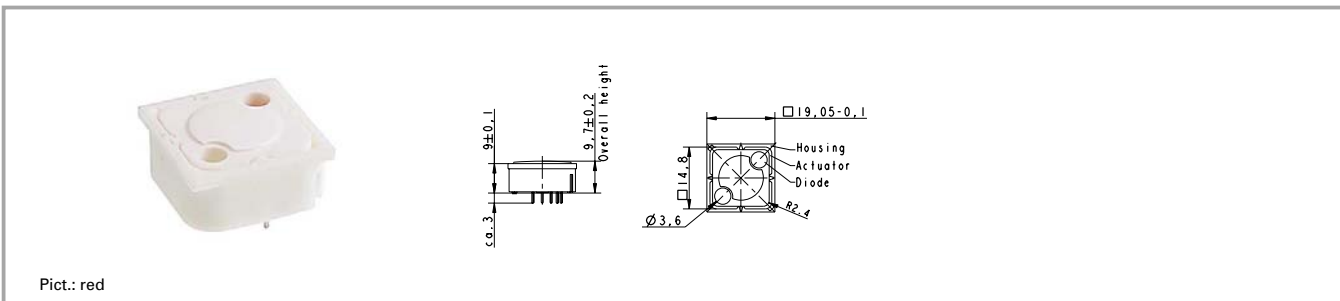


Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	fully illuminated 2 LEDs	red	red	2 mm	<b>3.14.002.011/0000</b>
Au	fully illuminated 2 LEDs	green	green	2 mm	<b>3.14.002.012/0000</b>
Au	fully illuminated 2 LEDs	yellow	yellow	2 mm	<b>3.14.002.013/0000</b>
Au	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.014/0000
Au	fully illuminated 2 LEDs	blue	blue	2 mm	3.14.002.015/0000
Ag	fully illuminated 2 LEDs	red	red	2 mm	3.14.002.021/0000
Ag	fully illuminated 2 LEDs	green	green	2 mm	3.14.002.022/0000
Ag	fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.002.023/0000
Ag	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.024/0000
Ag	fully illuminated 2 LEDs	blue	blue	2 mm	3.14.002.025/0000

Technical data see page 4 - 50

Technical data of LED see separate page of the beginning of this chapter.

## RF 19 short-travel keyswitch, 1 LED spot-illumination



Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	spot illumination 1 LED	opaque white	blue	3 mm	3.14.001.030/0000
Au	spot illumination 1 LED	transparent	red	3 mm	<b>3.14.001.031/0000</b>
Au	spot illumination 1 LED	transparent	green	3 mm	<b>3.14.001.032/0000</b>
Au	spot illumination 1 LED	transparent	yellow	3 mm	<b>3.14.001.033/0000</b>
Ag	spot illumination 1 LED	opaque white	blue	3 mm	3.14.001.040/0000
Ag	spot illumination 1 LED	transparent	red	3 mm	<b>3.14.001.041/0000</b>
Ag	spot illumination 1 LED	transparent	green	3 mm	<b>3.14.001.042/0000</b>
Ag	spot illumination 1 LED	transparent	yellow	3 mm	<b>3.14.001.043/0000</b>

Technical data see page 4 - 50

Versions with 2 LEDs available on request.

Technical data of LED see separate page of the beginning of this chapter.

## RF 19 short-travel keyswitch, 1 NC + 1 NO



### Technical data

#### General information

Recommended key grid 23 mm

#### Dimensions

Length 19.05 mm  
Width 19.05 mm  
Overall height 9.7 mm

#### Mechanical design

Mounting soldering into PCB  
Terminals contacts tin-plated, fix contact Ag plated bridge contact  
Contact system 1 NC + 1 NO  
Contact arrangement Au/Ag  
Contact materials none  
Illumination

#### Mechanical characteristics

Operating force max. 2 ... 3 N  
Operating travel 0.5 mm  
Switching travel 0.5 mm  
Robustness min. with through-plated PCB 100 N

#### Electrical characteristics

Rated voltage min. Au: 0,02 V, Ag: 3 V V  
Rated voltage max. Au: 42 V, Ag: 50 V V  
Rated current min. Au: 0,01 mA, Ag: 0,1 mA mA  
Rated current max. Au: 100 mA, Ag: 250 mA mA  
Rated power max. (ohmic load) Au: 2 W, Ag: 12.5 W

For keycaps, refer to RK 90.

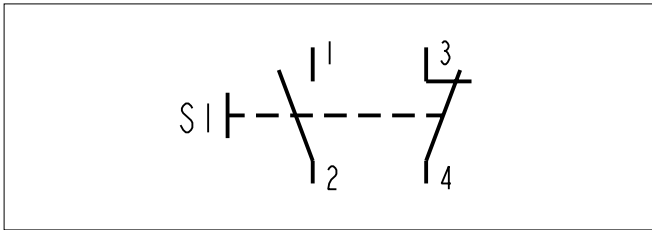
Contact resistance when new max. 100 mΩ  
Contact resistance acc. to life max. 3 Ω  
Insulation resistance 2 x 10<sup>6</sup> Ω  
ESD strength (underneath overlay) 15 kV  
Bouncing time max. 5 ms

#### Other specifications

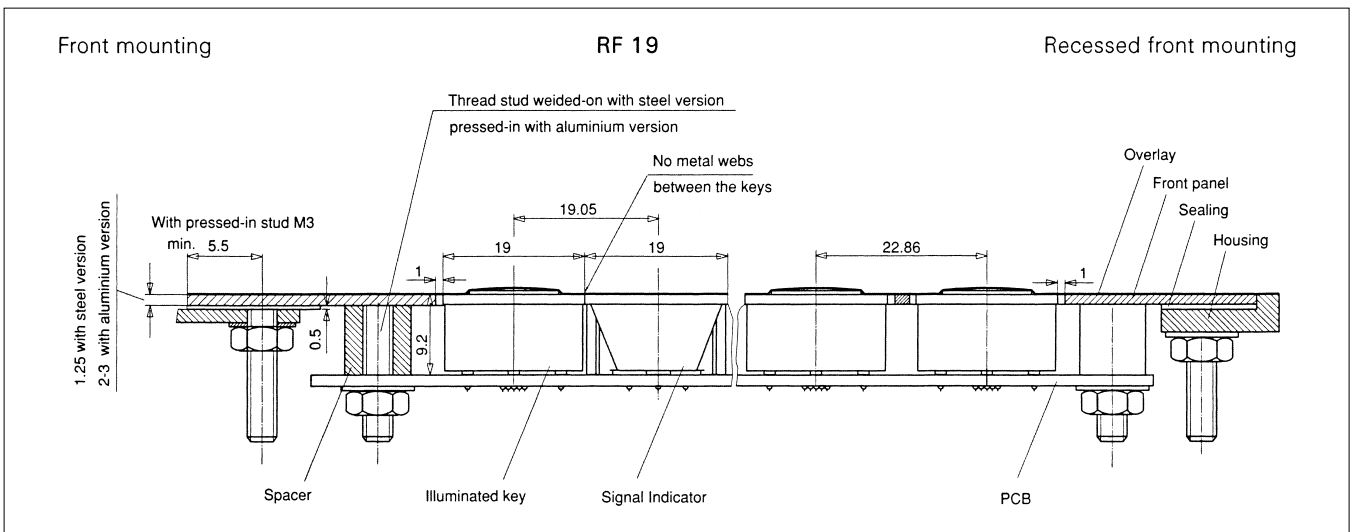
Ambient temp. operating min. -25 °C  
Ambient temp. operating max. +70 °C  
Storage temperature min. -40 °C  
Storage temperature max. (product) +80 °C  
Storage temperature max. (in tube) +50 °C  
Resistance to constant environment according to IEC 600 68-2-3 and 2-30  
Resistance at variable environment according to IEC 600 68-2-14 and 2-33  
Operating life min. 100000  
Soldering time max. 5 sec.  
Soldering temperature max. 265 °C  
Flammability of materials UL 94 HB



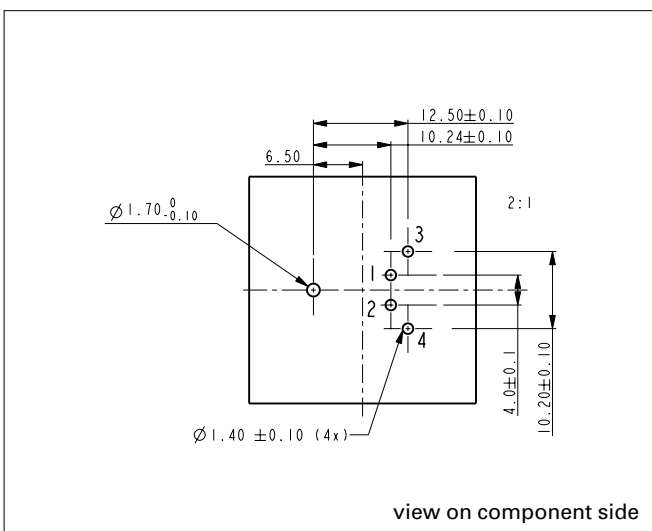
**Circuit Diagram**



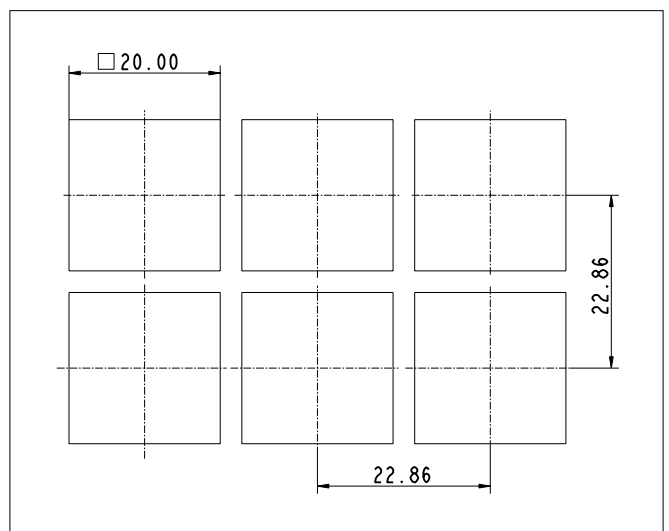
**Dimensional Drawing**



**Hole Pattern**



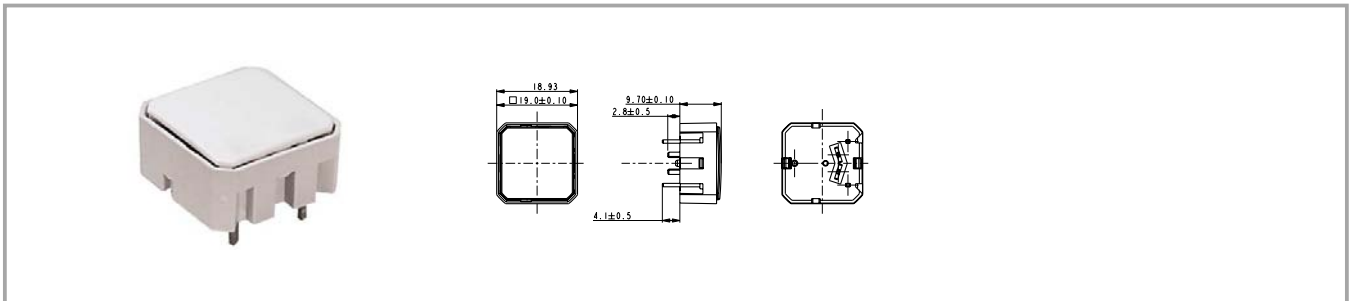
**Hole Pattern – Front Panel**



4

RF

## RF 19 short-travel keyswitch, non-illuminated



Contact materials	Contact arrangement	Illumination	Colour of lens	Order no.
Au	1 NC + 1 NO	not illuminated	opaque white	1.16.000.991/0000
Ag	1 NC + 1 NO	not illuminated	opaque white	1.16.000.990/0000

Technical data see page 4 - 56

## RF 19 H short-travel keyswitch



### General data

#### Application notes:

The RF 19H key has an overall height of 12.5 mm and can be fully illuminated. When designing membrane keyboards, we recommend using a key grid of at least 23 mm and a 0.13 mm overlay with area embossing over the keys. You can use the O-ring (accessory) to block the key and use it as an indicator field or blank spaceholder.

### Technical data

#### General information

Colour of lens see order block  
Recommended key grid 24 mm

#### Dimensions

Length 19.05 mm  
Width 19.05 mm  
Overall height 12.5 mm

#### Mechanical design

Mounting soldering into PCB  
Terminals contacts tin-plated, fix contact Ag plated  
Contact system snap-action contact  
Contact arrangement 1 NO  
Contact materials Au/Ag  
Illumination spot-/fully illuminated  
LED colour see order block  
LED type see order block

#### Mechanical characteristics

Operating force max. 2 ... 3 N  
Operating travel 0.5 mm  
Switching travel 0.5 mm  
Robustness min. with through-plated PCB 100 N

#### Electrical characteristics

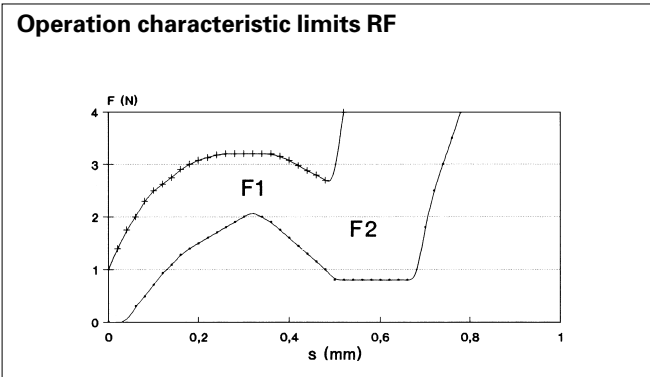
Rated voltage min. Au: 0.02 V, Ag: 3 V  
Rated voltage max. Au: 42 V, Ag: 50 V  
Rated current min. Au: 0,01 mA, Ag: 0,1 mA  
Rated current max. Au: 100 mA, Ag: 250 mA

Rated power max. (ohmic load) Au: 2 W, Ag: 12.5 W  
Contact resistance when new max. 100 mΩ  
Contact resistance acc. to life max. 3 Ω  
Insulation resistance 10<sup>9</sup> Ω  
ESD strength (underneath overlay) 15 kV  
Bouncing time max. 5 ms

#### Other specifications

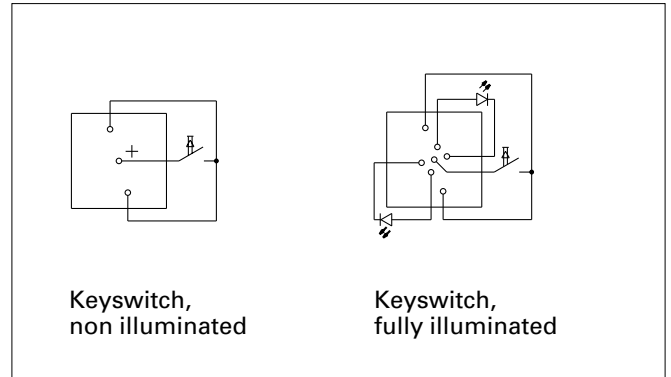
Ambient temp. operating min. -25 °C  
Ambient temp. operating max. +70 °C  
Storage temperature min. -40 °C  
Storage temperature max. (product) +80 °C  
Storage temperature max. (in tube) +50 °C  
Resistance to constant environment according to IEC 600 68-2-3 and 2-30  
Resistance at variable environment according to IEC 600 68-2-14 and 2-33  
Operating life min. 1,000,000  
Soldering time max. 2,5 sec.  
Soldering temperature max. 250 °C  
Flammability of materials UL 94 HB

## Force/Travel Diagram – Keyswitch RF 19 H

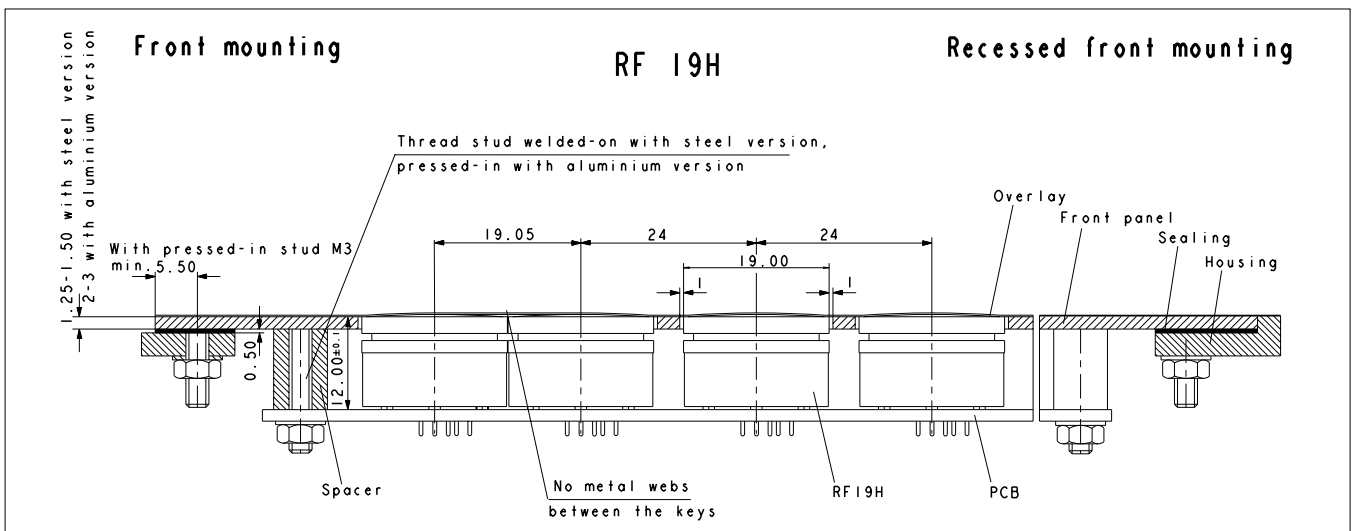


F 1 = Max. operating force  
F 2 = Force at contact  
F 2 is max. 55% of F 1

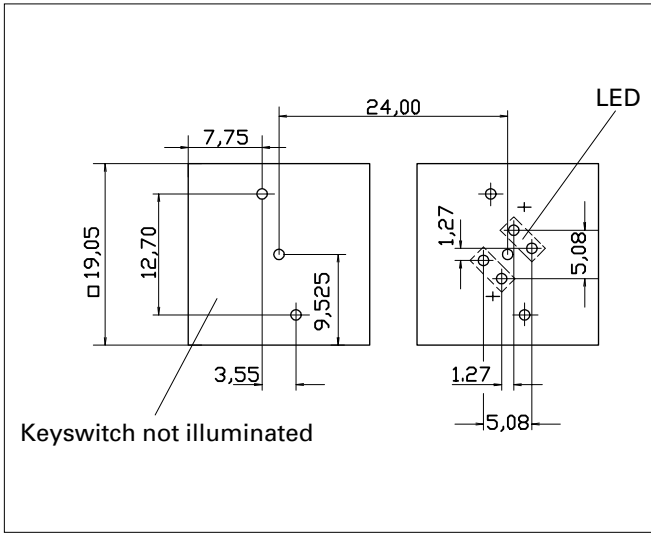
## Circuit Diagram – Keyswitch RF 19 H



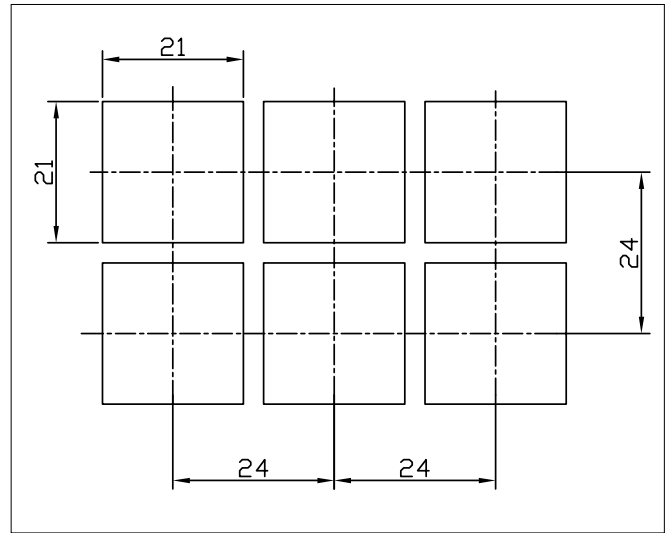
## Dimensional Drawing



## Hole Pattern RF 19 H



## Hole Pattern – Front Panel RF 19 H



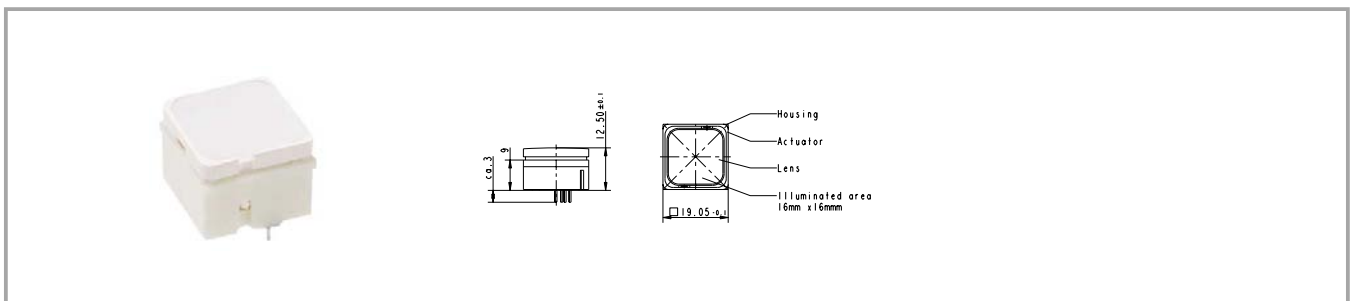
\* The LED may be positioned either on the left-hand or right-hand side.  
 Standard version: LED on left-hand side  
 View on component side, all hole diameters  
 1,1 +/- 0,1 mm

4

## Accessories RF 19 H short-travel keyswitch

Description	Photo	Order no.	Page
O-ring, black, 17.0 x 1.5, for blocking RF 19H keys		5.30.125.003/0100	5 - 27

## RF 19 H keyswitch, non-illuminated

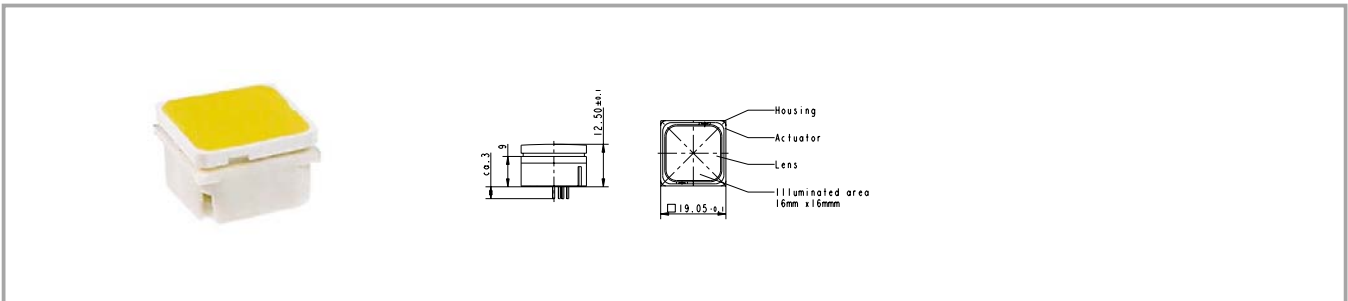


RF

Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	not illuminated	white			3.14.001.501/0000
Ag	not illuminated	white			3.14.001.506/0000

Technical data see page 4 - 60

## RF 19 H short-travel keyswitch, fully illuminated

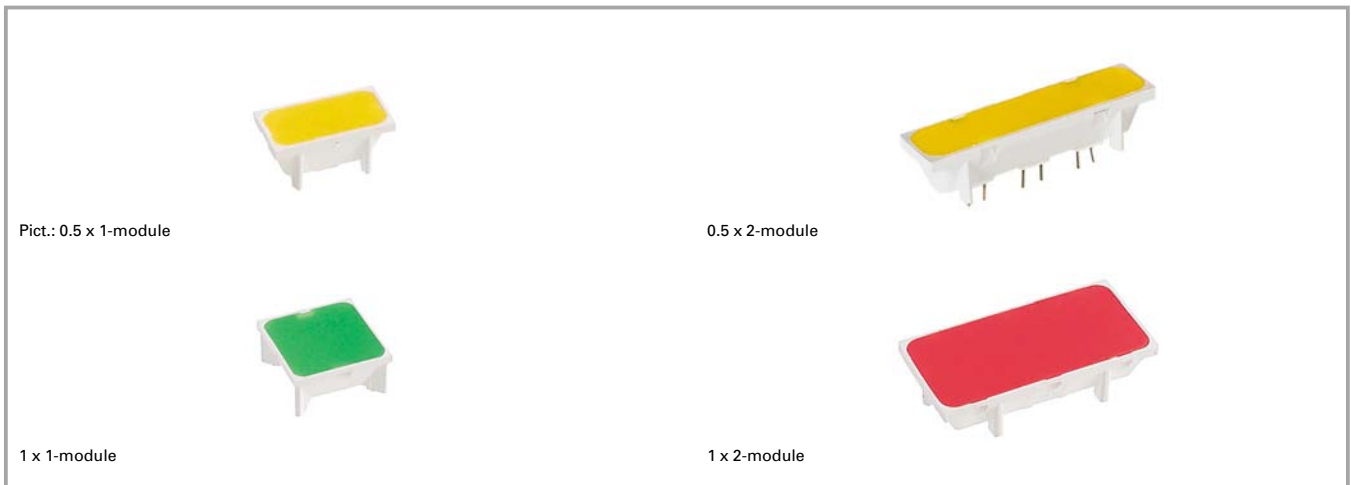


Contact materials	Illumination	Colour of lens	LED colour	LED type	Order no.
Au	fully illuminated 2 LEDs	red	red	2 mm	3.14.002.613/0000
Au	fully illuminated 2 LEDs	green	green	2 mm	3.14.002.632/0000
Au	fully illuminated 1 LED	green	green super bright	3 mm	3.14.002.633/0000
Au	fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.002.653/0000
Au	fully illuminated 1 LED	white	white	3 mm	3.14.002.684/0000
Au	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.673/0000
Au	fully illuminated 2 LEDs	white	multi colour	3 mm	3.14.001.672/0000
Au	fully illuminated 1 LED	blue	blue	3 mm	3.14.002.683/0000
Ag	fully illuminated 2 LEDs	red	red	2 mm	3.14.002.623/0000
Ag	fully illuminated 2 LEDs	green	green	2 mm	3.14.002.642/0000
Ag	fully illuminated 1 LED	green	green super bright	3 mm	3.14.002.643/0000
Ag	fully illuminated 1 LED	blue	blue super bright	3 mm	3.14.002.688/0000
Ag	fully illuminated 2 LEDs	yellow	yellow	2 mm	3.14.002.663/0000
Ag	fully illuminated 1 LED	white	white	3 mm	3.14.002.689/0000
Ag	fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.678/0000
Ag	fully illuminated 2 LEDs	white	multi colour	3 mm	3.14.001.682/0000

Technical data see page 4 - 60

When using the keyswitches with multicolour LEDs the illumination colour can be varied from red to green by change of polarity. Due to the frequency of the polarity-changes the colours red, green, yellow as well as all secondary colours from these are possible. Technical data of LED see separate page of the beginning of this chapter.

## RF 19 signal indicator



## Technical data

### General information

Colour of lens see order block  
Recommended key grid 23/x mm

### Dimensions

Length see order block  
Width see order block  
Overall height 9.15 mm

### Mechanical design

Mounting soldering into PCB  
Illumination see order block  
LED colour see order block  
LED type see order block

### Other specifications

Ambient temp. operating min. -25 °C

Ambient temp. operating max.

+70 °C

Storage temperature min.

-40 °C

Storage temperature max. (product)

+80 °C

Storage temperature max. (in tube)

+50 °C

Resistance to constant environment

according to IEC 600 68-2-3 and 2-30

Resistance at variable environment

according to IEC 600 68-2-14 and 2-33

Soldering time max.

2,5 sec.

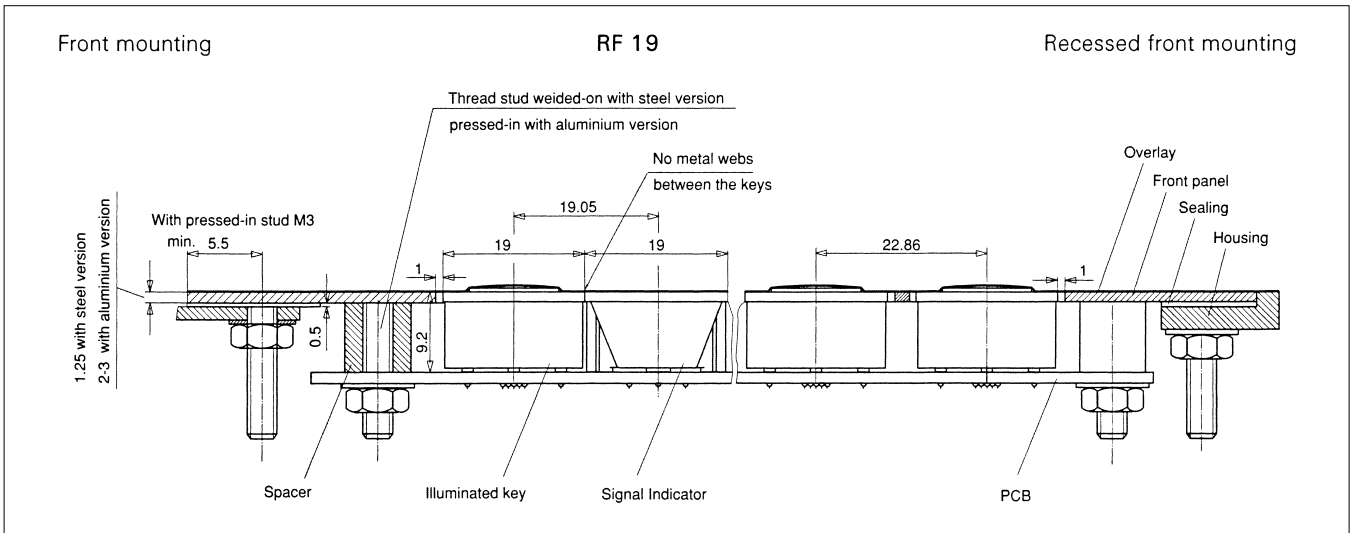
Soldering temperature max.

250 °C

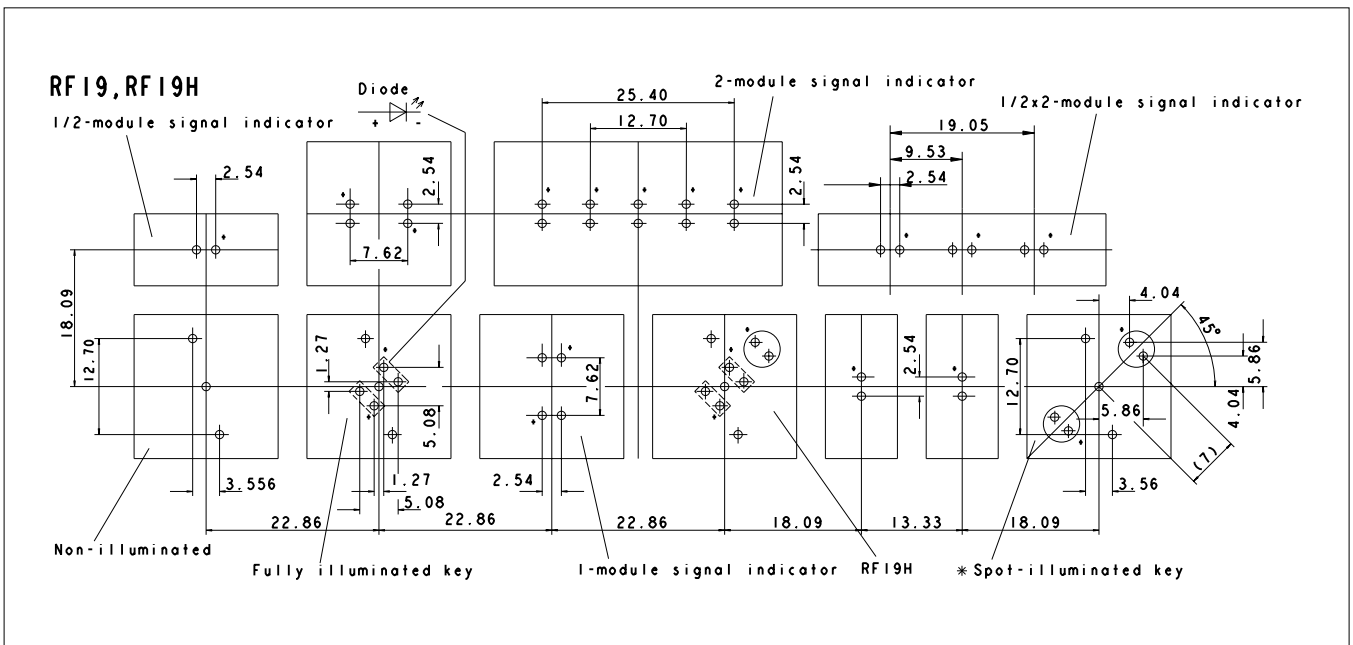
Flammability of materials

UL 94 HB

**Dimensional Drawing Signal Indicator RF 19**



**Hole Patterns RF 19**



\* The LED may be positioned either on the left-hand or right-hand side.  
Standard version: LED on left-hand side  
View on component side, all hole diameters 1,1 +/- 0,1 mm

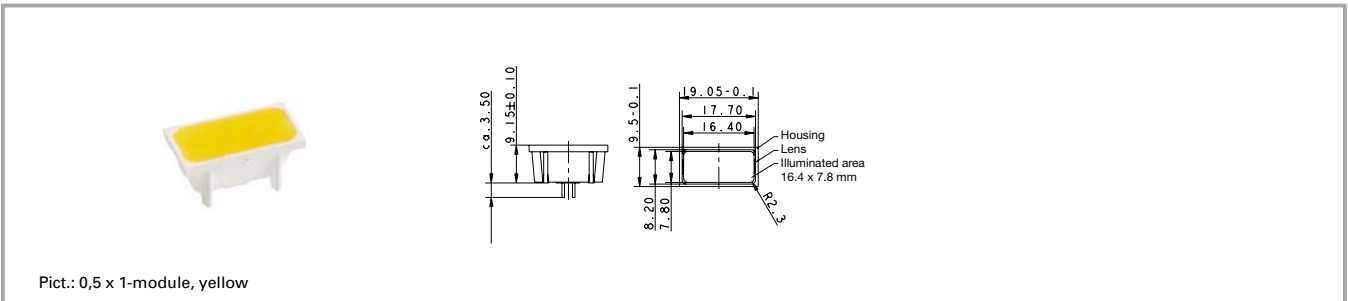
Front panel cut-out = outer keyswitch size + 1 mm

4

RF



## RF 19 signal indicator, 1/2 x 1-module



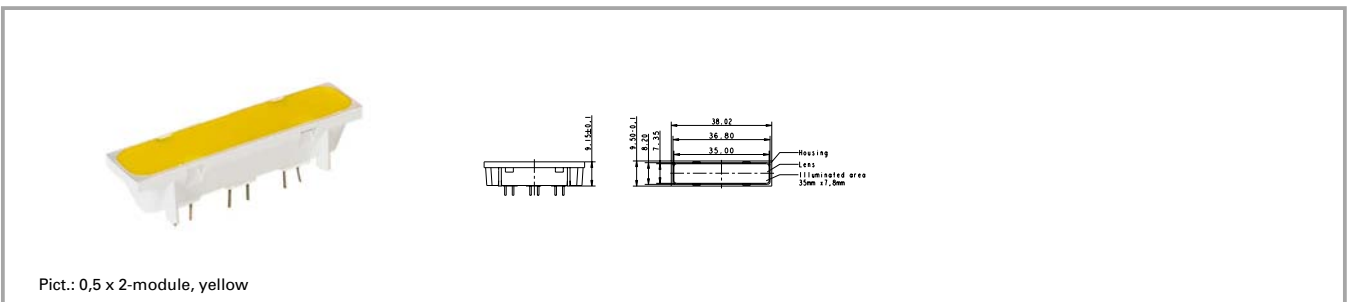
Pict.: 0,5 x 1-module, yellow

illumination	Colour of lens	LED colour	LED type	Order no.
fully illuminated 1 LED	red	red	2 mm	<b>3.14.002.061/0000</b>
fully illuminated 1 LED	green	green	2 mm	<b>3.14.002.062/0000</b>
fully illuminated 1 LED	yellow	yellow	2 mm	<b>3.14.002.063/0000</b>
fully illuminated 1 LED	orange	yellow	2 mm	3.14.002.064/0000

Technical data see page 4 - 64

For more information, see LEDs.

## RF 19 signal indicator, 1/2 x 2-module



Pict.: 0,5 x 2-module, yellow

illumination	Colour of lens	LED colour	LED type	Order no.
fully illuminated 3 LEDs	red	red	2 mm	3.14.002.908/0000
fully illuminated 3 LEDs	green	green	2 mm	3.14.002.909/0000
fully illuminated 3 LEDs	yellow	yellow	2 mm	3.14.002.910/0000
fully illuminated 3 LEDs	orange	yellow	2 mm	3.14.002.911/0000

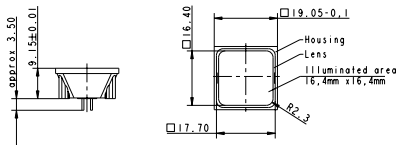
Technical data see page 4 - 64

For more information, see LEDs.

4

RF

## RF 19 signal indicator, 1 x 1-module



Pict.: 1 x 1-module, green

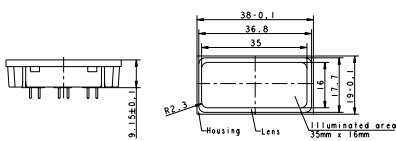
illumination	Colour of lens	LED colour	LED type	Order no.
fully illuminated 2 LEDs	red	red	2 mm	<b>3.14.002.051/0000</b>
fully illuminated 2 LEDs	green	green	2 mm	<b>3.14.002.052/0000</b>
fully illuminated 2 LEDs	yellow	yellow	2 mm	<b>3.14.002.053/0000</b>
fully illuminated 2 LEDs	orange	yellow	2 mm	3.14.002.054/0000
fully illuminated 2 LEDs	blue	blue	2 mm	3.14.001.659/0000

Technical data see page 4 - 64

For more information, see LEDs.

Suitable for RK 90 system design, illuminated for 2-module keycap.

## RF 19 signal indicator, 1 x 2-module



Pict.: 1 x 2-module, red

illumination	Colour of lens	LED colour	LED type	Order no.
fully illuminated 5 LEDs	red	red	2 mm	<b>3.14.002.071/0000</b>
fully illuminated 5 LEDs	green	green	2 mm	<b>3.14.002.072/0000</b>
fully illuminated 5 LEDs	yellow	yellow	2 mm	<b>3.14.002.073/0000</b>
fully illuminated 5 LEDs	orange	yellow	2 mm	3.14.002.074/0000

Technical data see page 4 - 64

For more information, see LEDs.

RF special accessories



Pict.: light grey

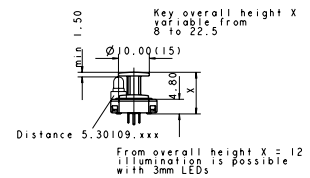
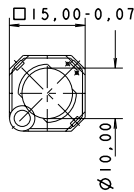


round and triangular versions

Extension plunger for RF 15 N, round head



Pict.: light grey



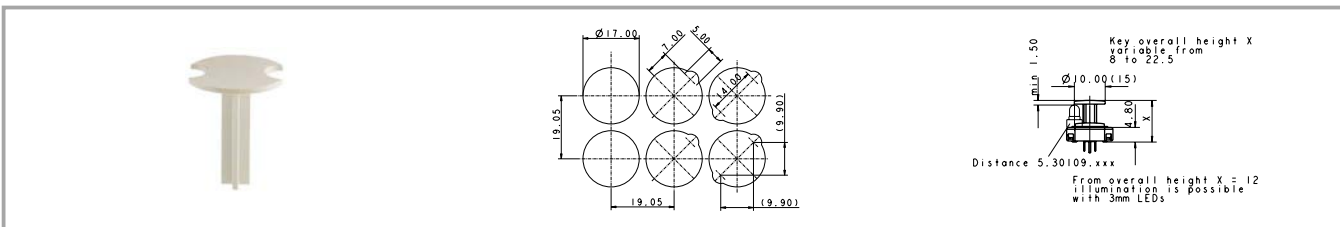
Length	Width	Overall height	Diameter	Colour	Order no.
		9 mm	10 mm		<b>5.46.011.036/0710</b>
		9.7 mm	10 mm		<b>5.46.011.030/0710</b>
		12.5 mm	10 mm		<b>5.46.011.037/0710</b>
		13 mm	10 mm		<b>5.46.011.038/0710</b>
		22.5 mm	10 mm		<b>5.46.011.028/0710</b>

Length of plunger = Overall height - 4.25 mm.

4

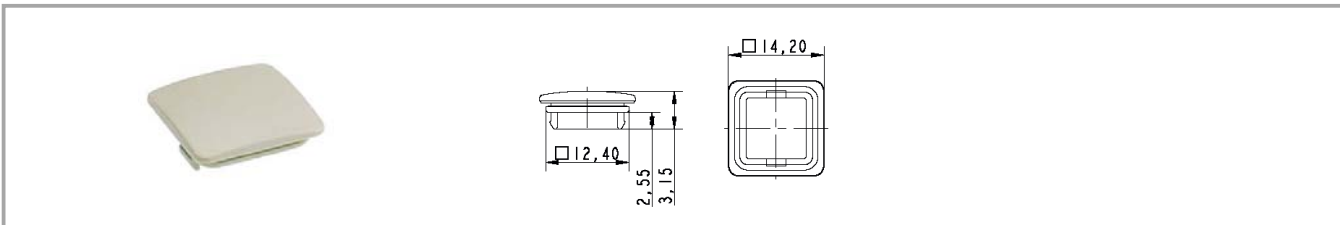
RF

## Extension plunger for RF 15 N, round head, with recess for LED



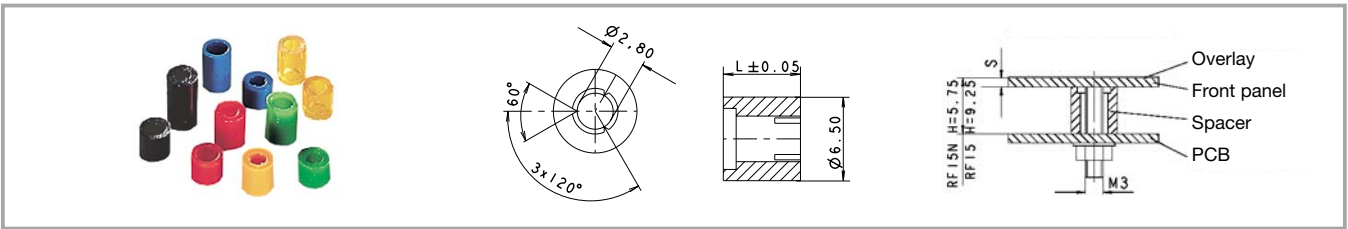
Length	Width	Overall height	Diameter	Colour	Order no.
		9 mm	15 mm		<b>5.46.017.036/0710</b>
		9.7 mm	15 mm		<b>5.46.017.030/0710</b>
		12.5 mm	15 mm		<b>5.46.017.037/0710</b>
		13 mm	15 mm		<b>5.46.017.038/0710</b>
		22.5 mm	15 mm		<b>5.46.017.028/0710</b>

## Keycap for RF 15, snap-on, for overall height 12.5 mm



Length	Width	Overall height	Diameter	Colour	Order no.
14.2 mm	14.2 mm	12.5 mm		beige	5.46.654.059/0227

## Spacers, round

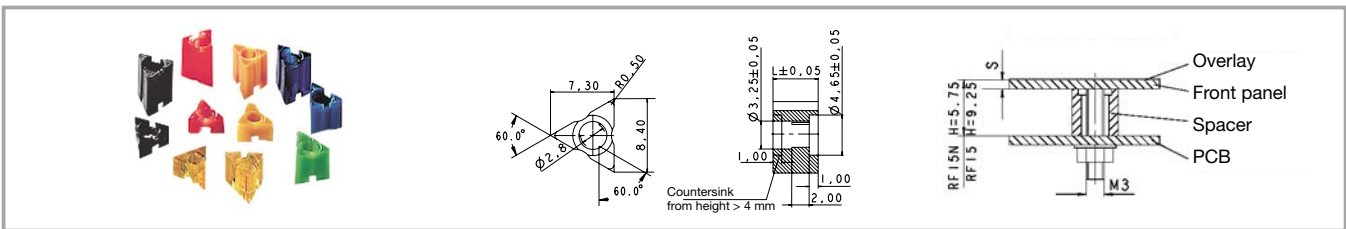


Length	Width	Overall height	Diameter	Colour	Order no.
3.50 mm				blue transparent	<b>5.30.759.023/0000</b>
4 mm				green	<b>5.30.759.025/0000</b>
4.25 mm				blue	<b>5.30.759.026/0000</b>
4.50 mm				red	<b>5.30.759.027/0000</b>
4.75 mm				blue transparent	<b>5.30.759.028/0000</b>
5 mm				black	<b>5.30.759.029/0000</b>
5.25 mm				yellow orange transparent	<b>5.30.759.030/0000</b>
5.50 mm				yellow	<b>5.30.759.031/0000</b>
5.75 mm				green	<b>5.30.759.032/0000</b>
6 mm				blue	<b>5.30.759.033/0000</b>
6.2 mm				blue	<b>5.30.759.251/0000</b>
6.25 mm				red	<b>5.30.759.034/0000</b>
6.50 mm				blue transparent	<b>5.30.759.035/0000</b>
6.75 mm				black	<b>5.30.759.036/0000</b>
7 mm				yellow orange transparent	<b>5.30.759.037/0000</b>
7.25 mm				yellow	<b>5.30.759.038/0000</b>
7.50 mm				green	<b>5.30.759.039/0000</b>
7.75 mm				blue	<b>5.30.759.040/0000</b>
8 mm				red	<b>5.30.759.041/0000</b>
8.25 mm				blue transparent	<b>5.30.759.042/0000</b>
9.00 mm				green	<b>5.30.759.046/0000</b>
10.00 mm				black	<b>5.30.759.043/0104</b>

4

RF

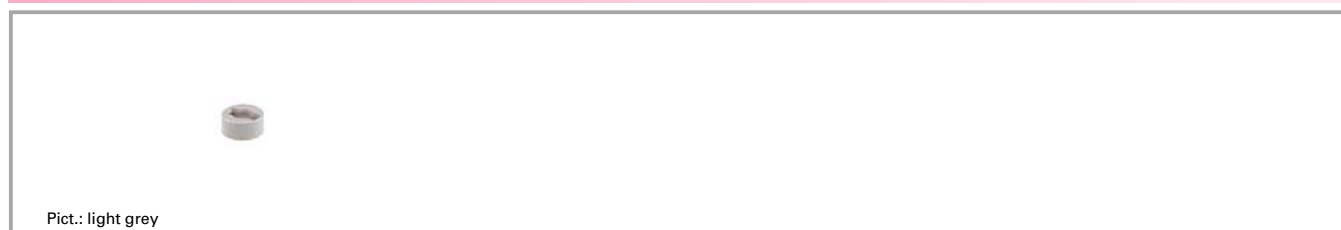
## Spacers, triangular



Length	Width	Overall height	Diameter	Colour	Order no.
2.50 mm				blue	<b>5.30.759.094/0000</b>
2.75 mm				red	<b>5.30.759.095/0000</b>
3 mm				blue transparent	<b>5.30.759.096/0000</b>
3.25 mm				black	<b>5.30.759.097/0000</b>
3.50 mm				yellow orange transparent	<b>5.30.759.098/0000</b>
3.75 mm				yellow	<b>5.30.759.099/0000</b>
4 mm				green	<b>5.30.759.100/0000</b>
4.25 mm				blue	<b>5.30.759.101/0000</b>
4.50 mm				red	<b>5.30.759.102/0000</b>
4.75 mm				blue transparent	<b>5.30.759.103/0000</b>
5 mm				black	<b>5.30.759.104/0000</b>
5.25 mm				yellow orange transparent	<b>5.30.759.105/0000</b>
5.50 mm				yellow	<b>5.30.759.106/0000</b>
5.75 mm				green	<b>5.30.759.107/0000</b>
6 mm				blue	<b>5.30.759.108/0000</b>
6.2 mm				blue	<b>5.30.759.253/0000</b>
6.25 mm				red	<b>5.30.759.109/0000</b>
6.50 mm				blue transparent	<b>5.30.759.110/0000</b>
6.75 mm				black	<b>5.30.759.111/0000</b>
7 mm				yellow orange transparent	<b>5.30.759.112/0000</b>
7.25 mm				yellow	<b>5.30.759.113/0000</b>
7.50 mm				green	<b>5.30.759.114/0000</b>
7.75 mm				blue	<b>5.30.759.115/0000</b>

Length	Width	Overall height	Diameter	Colour	Order no.
8 mm				red	<b>5.30.759.116/0000</b>
8.25 mm				blue transparent	5.30.759.117/0000
9 mm				blue	<b>5.30.759.254/0000</b>
10.00 mm				black	5.30.759.124/0000
10.25 mm				yellow orange transparent	5.30.759.125/0000

## LED spacer for RF 15 N



Length Characteristic 1	Width Characteristic 2	Overall height	Diameter	Colour	Order no.
2.2 mm		12.5 mm	5 mm	light grey	5.30.109.010/0756
12 mm		22.5 mm	5 mm	black	5.30.109.019/0105

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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