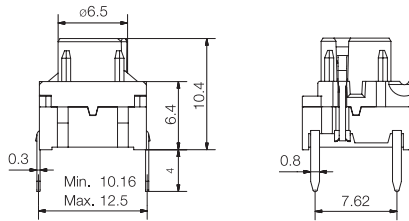


Technical Data

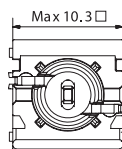
- through-hole or SMD
- 50mA/24VDC
- single pole/momentary
- 10.000.000 operations life time
- IP67 sealing
- temperature range:
high temp. switch; -40/+160°C
LED: -30/+85°C



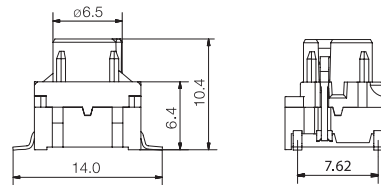
Dimensions (through-hole)



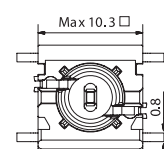
Top View



Dimensions (SMD)

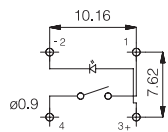


Top View

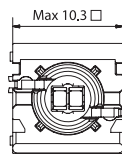
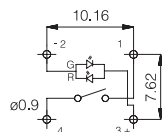


PCB layout and Circuit Diagram

1 LED

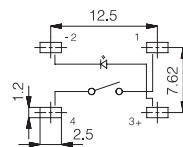


2 LEDs

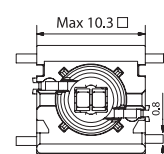
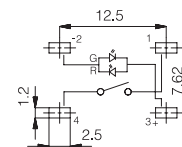


PCB layout and Circuit Diagram

1 LED



2 LEDs



Technical specifications for 4F switch and LEDs see pages 35 and 36

How to order

4 F

LED Illuminated Cap

Switch Mounting
SH9 surface mount
TH9 through-hole

LED
01
22
42
61
82
2242
8222
8242

Illuminated Cap

- 1D
- 1K,1KB,1KC
- 1N
- 1S
- 1T
- 1U
- 1V
- 1WA,1WD,1WP
- 1X

Colour code

- | | | | |
|----------------|-----|----------------------------------|------------------|
| 11,16 | Cap | Solid Colour | Illuminated Lens |
| 11,16 | | 1E Solid Colour + lens 1,2,4,6,8 | |
| 10,12,14,16,18 | | 1F Solid Colour + lens 1,2,4,6,8 | |
| 11 | | 1Q Solid Colour + lens 1,6 | |
| 16 | | 1R Solid Colour + lens 1,6 | |
| 16 | | | |
| 16 | | | |
| 16 | | | |
| 11 | | | |

Colour codes

LEDs
01 blue
22 green
42 yellow
61 white
82 red
2242 green/yellow
8222 red/green
8242 red/yellow

Illuminated Caps
01 frosted blue
11 transparent
12 frosted green
14 frosted yellow
16 frosted white
18 frosted red

Lenses
1 transparent
2 green
4 yellow
6 frosted white
8 red

Solid Colours

1E,1F 1Q,1R
00 blue 00 blue
02 green 03 grey
03 grey 08 red
04 yellow 09 black
06 white
08 red
09 black

Dimensions

Caps
1D,1E,1F 15
1K,1KB,1KC 16
1N 14
1Q,1R 18
1S 21
1T,1U,1V 19
1WA,1WD,1WP 17
1X 20

See Page

Ordering example: 4FSH98242 + 1D11 or 4FTH922 + 1T16

For updates of products and/or changes of specifications please see www.mec.dk

RoHS Compatible

	3A-3C-3E-3F Low Temperature Versions		3A-3C-3E-3F High Temperature Versions		illumec™ 4A - 4F High Temperature Versions	
	Silver	Gold	Silver	Gold	Silver	Gold
Electrical Specifications						
Contact resistance	<30m Ω - typ. 10m Ω		<30m Ω - typ. 10m Ω		<30m Ω - typ. 10 m Ω	
Insulation resistance	>10M Ω		>10M Ω		>10M Ω	
Recommended load	0.5-50mA 24VDC	0.5μ-50mA 24VDC	0.5-50mA 24VDC	0.5μ-50mA 24VDC	0.5-50mA 24VDC	0.5μ-50mA 24VDC
Contact bounce	<2mS - typically 0.5mS		<2mS - typically 0.5mS		<2mS - typically 0.5mS	
Mechanical Specifications						
Standard actuation force (switch)	3.0N typ.		3.0N typ.		3.0N typ.	
Max. actuation force without cap	100N for 10 sec.		100N for 10 sec.		100N for 10 sec.	
Key travel (switch)	1 mm		1 mm		1 mm	
Life time (switch)	>10.000.000 cycles		>10.000.000 cycles		>10.000.000 cycles	
Temperature Range						
Working temperature	Min. -40°C Max. +115°C		Min. -40°C Max. +160°C		Min. -30°C Max. +85°C*	
Storage temperature	Min. -40°C Max. +115°C		Min. -40°C Max. +160°C		Min. -30°C Max. +85°C*	
Soldering IEC 68-2-20	Wave - max. 260°C for max. 10 sec., please refer to usage guidelines. Soldering iron - max. 350°C for max. 3 sec. Flux tight.		Infrared, vapour phase, wave - max. 240°C for max. 40 sec. or max. 260°C for max. 30 sec. Soldering iron - max. 350°C for max. 3 sec. Flux tight.		Infrared, vapour phase, wave - max. 240°C for max. 40 sec. or max. 260°C for max. 30 sec. Soldering iron - max. 350°C for max. 3 sec. Flux tight.	
Environmental Endurance IEC 68-2-3						
Temperature	+40°C		+40°C		+40°C	
Humidity	93% RH		93% RH		93% RH	
Duration	56 Days		56 Days		56 Days	
Temperature Cycling IEC 68-2-14						
Temperature limit	Min. -40°C - Max. +125°C		Min. -40°C - Max. +125°C		Min. -40°C - Max. +125°C	
Number of cycles	10		10		10	
Exposure time at each temperature	30 min.		30 min.		30 min.	
Recovery time before measurements	16 hrs.		16 hrs.		16 hrs.	
Sealing IEC 529	IP-67		IP-67		IP-67	
Cleaning	Standard methods - see usage guidelines		Standard methods - see usage guidelines		Standard methods - see usage guidelines	
Vibration Test IEC 68-2-6						
Cycles					10	
Cycles time					2 hrs.	
Material Specifications - Switches						
Housing	PBT UL94VO		PPS UL94VO		PPS UL94VO	
Actuator	PBT UL94VO		PPS UL94VO		PPS UL94VO	
Sealing + spring	Silicone rubber		Silicone rubber		Silicone rubber	
Contact spring	Stainless steel + 3μAg	Stainless steel + 1μAu	Stainless steel + 3μAg	Stainless steel + 1μAu	Stainless steel + 3μAg	Stainless steel + 1μAu
Fixed contacts	SnCu + 2μNi + 3μAg	SnCu + 2μNi + 1μAu	SnCu + 2μNi + 3μAg	SnCu + 2μNi + 1μAu	SnCu + 2μNi + 3μAg	SnCu + 2μNi + 1μAu
Terminals	SnCu + 2μNi + 3μSn100	SnCu + 2μNi + 3μSn100	SnCu + 2μNi + 3μSn100	SnCu + 2μNi + 3μSn100	SnCu + 2μNi + 3μSn100	SnCu + 2μNi + 3μSn100
Material Specifications - Caps & Bezels						
Material	Parts			Temp limit	UL rating	
ABS	1A, 1B, 1C, 1D, 1E, 1F, 1H, 1K, 1M, 1N, 1P, 1Q, 1R, 1T, 1U, 1V, 1WA, 1WD, 1WP, 1X, 1ZA, 1ZB, 1ZC.			Max. 65°C	UL94HB	
Polycarbonate	All lenses, 3E coloured actuators			Max. 85°C	UL94V1	
LCP	Black actuator of 3E			Max. 160°C	UL94VO	
PPS	1S, 2S			Max. 160°C	UL94VO	
Polyamide	Actuator of Varimec™, 1GA/1GC			Max. 160°C	UL94VO	
Legends Adhesion	ISO Class: 1/ASTM Class: 4B DIN EN ISO 2409					

* LED max. working temperature

Specifications are subject to change without notice.

For updates of products and/or changes of specifications please see www.mec.dk

For 3A switches		3AXXX (for 1C/1H)				2BXXX		
Colour		B	G	Y	R	G	Y	R
Colour Codes		00	20	40	80	20	40	80
Absolute Maximum Ratings (Ta=25°C)								
Power	mW	105	100	60	100	75	60	60
Current forward	mA	30	30	20	30	20	20	20
Forward peak current	mA	150	120	80	120	60**	60**	60**
Voltage reverse	V	5	5	5	5	3	3	3
Operating temperature	°C	-40 - +85			-25 - +85			
Storage temperature	°C	-40 - +85			-30 - +100			
Soldering temperature	°C	260/5 sec.			260 for max. 3 sec.			260 for max. 5 sec.
Electrical-Optical Characteristics (Ta=25°C)								
Voltage forward	Typ. V	3.8	2.1*	2.1*	2.0*	2.1	2.1	2.0
	Max. V	4.5	2.8*	2.8*	2.8*	3.0	3.0	3.0
Current reverse (VR = 5V)	µA	10	100	100	100	10	10	10
Wave length	nm	466	565	585	630	563	585	650
Spread	Δnm	30	30	35	40	40	40	40
Spread angle	degree	40	90	90	90	45	45	45
Luminous Intensity	Min. mcd	4	0.7	1.7	1.1	9.0	5.6	5.6
	Typ. mcd	10	2.5	5.6	3.7	25	16	16
Orientation	The longer pin is the anode, the shorter is the cathode							

*If = 20mA, **Pulse width 1ms Duty cycle 1:5

For 3F switches		3FXXX (for 1E-1F-1N-1Q-1R-1S-1X)					3FXXX (for 1K-1T-1U-1V-1W-1WD)					
Colour		B	G	Y	R	G/Y	R/G	R/Y	G	Y	R	
Colour Codes		00	20	40	80	2040	8020	8040	23	45	88	
Absolute Maximum Ratings (Ta=25°C)												
Power	mW	105	70	60	60	120	120	120	150	130	300	
Current forward	mA	30	20	20	20	25	25	25	40	40	90	
Forward peak current	mA	200	60**	60**	60**	150	150	150	500	500	1000	
Voltage reverse	V	5	3	3	3	5	5	5	12	12	5	
Operating temperature	°C	-25 - +85					-40 - +85			-55 - +100		
Storage temperature	°C	-30 - +100					-40 - +85			-55 - +100		
Soldering temperature	°C	260 for max. 5 sec.					260 for max. 2 sec.			300 for max. 3 sec.		
Electrical-Optical Characteristics (Ta=25°C)												
Voltage Forward	Typ. V	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1*	2.3***	2.4***	
	Max. V	2.8	3.0	3.0	3.0	2.8	2.8	2.8	2.5*	2.5***	3.8***	
Current reverse (VR = 5V)	µA	2	10	10	10	2	2	2	10	10	10	
Wave length	nm	460	563	585	650	565/590	625/565	625/590	570	587	635	
Spread	Δnm	40	40	40	40	35	35	35	25	45	45	
Spread angle	degree	20	45	45	45	60	60	60	80	90	55	
Luminous Intensity	Min. mcd	20	9.0	5.6	5.6	8	8	8	71****	71****	100****	
	Typ. mcd	25	25	16	16	25	25	25	112****	112****	160****	
Orientation	The longer pin is the anode, the shorter is the cathode. For bicolor LEDs the anode for the first colour (ex. 2080) is the longer pin.											

If = 50mA, *Luminous Flux mlm

For 4A/4F switches		illumecc™ LEDs specifications				
Colour		B	G	Y	W	R
Colour Codes		01	22	42	61	82
Absolute Maximum Ratings (Ta=25°C)						
Power	mW	60	65	65	80	65
Current forward	mA	20	25	25	15	25
Forward peak current	mA	150	150	100	200	100
Voltage reverse	V	5	12	12	5	12
Operating temperature	°C	-30 - +85				
Storage temperature	°C	-30 - +85				
Soldering temperature	°C	245 for max. 10 sec.				
Electrical-Optical Characteristics (Ta=25°C)						
Voltage forward	Typ. V	3.35	2.2	2	3.05	2
	Max. V	3.5	2.5	2.5	3.2	2.5
Current reverse (VR = 5V)	µA	0.01	0.02	0.01	0.01	0.01
Wave length	nm	470	570	588	n.a.	633
Spread	Δnm	n.a.	30	16	n.a.	16
Spread angle	degree	145	160	160	138	160
Luminous Intensity	Min. mcd	30	28	112	28	112
	Typ. mcd	35	70	150	35	150
Optical Intensity	Lm/w	4				2.5

B= Blue, G= Green, Y= Yellow, R= Red, W= White, G/Y= Green/Yellow, R/G= Red/Green, R/Y= Red/Yellow
Specifications are subject to change without notice.

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