multimec®

Square cap with different top surface options

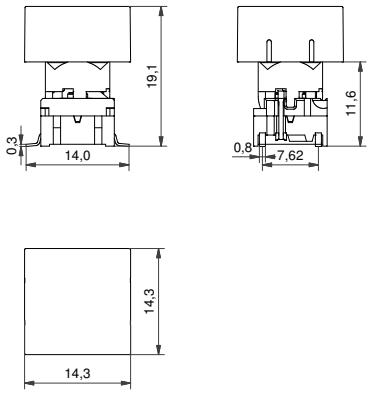
5G + 1KS/1KBS/1KCS+2K

- Square caps
- Different top surfaces: flat, convex or concave
- 14.3 mm x 14.3 mm
- h =19.1 mm; 20.2 mm; 20.1 mm
- Material: ABS/polycarbonate
- Temp. Range:
  - Solid cap: -40/+65°C
  - Transparent cap: -40/+85°C
- Panel cut-out: 1KS/1KBS/1KCS-14.7 x 14.7

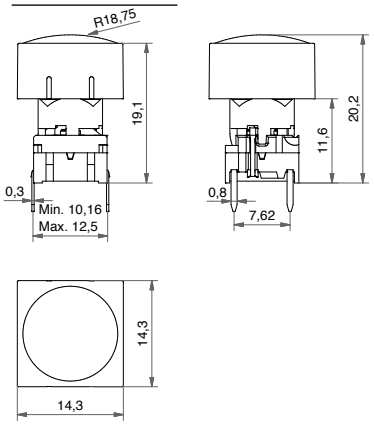
All dimensions in mm *Tolerances -/+0.2mm* *Custom solution*

DIMENSIONS

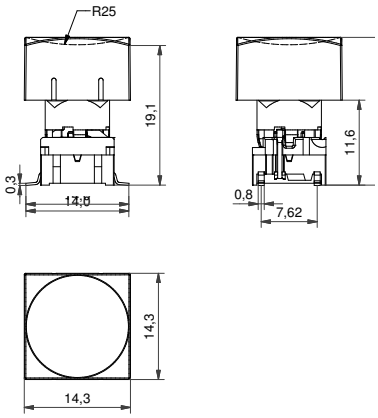
SMD w/LED + 1KS



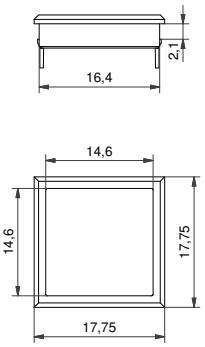
TH w/LED + 1KBS



SMD w/LED + 1KCS



Bezel (optional)



ILLUMINATED – HOW TO ORDER

Switch	Mounting	Actuation force	LED		Cap		Bezel
5 G				+	1 1 1 6	+	2 K

TH9 through-hole
SH9 surface mount

20
35
65
Q*

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

Frosted white lens and transparent lid

1KS

1KCS

1KBS

03 grey
06 white
08 red
09 black

*For an illuminated quiet 2.0N switch add Q to the end of the switch part number.

NON-ILLUMINATED– HOW TO ORDER

Switch	Mounting	Actuation force		Cap		Bezel
5 G			+	1 K S 1 6	+	2 K

TH9 through-hole
SH9 surface mount

20
20Q
35
65

Frosted white lens

1KS

Colour code
00 blue
02 green
03 grey
04 yellow
06 white
08 red
09 black

03 grey
06 white
08 red
09 black

Ordering example:
5GTH93501+1KCS1116+2K09 with illumination OR 5GSH965+1KS0916+2K03 without illumination OR *5GTH92082Q (illuminated quiet version)
Please see colour codes, updates of products and changes of specifications on www.mec.dk

multimec®

Solid colours

No.	00	02	03	04	06	08	09
Colour	blue	green	grey	yellow	white	red	black
RAL Code	5012	6018	7004	1023	9010	3000	9004

No.	30	32	33	34	38	40	42
Colour	ultra blue	mint green	tele grey	melon	noble red	dusty blue	aqua blue
RAL Code	5002	6029	7046	1028	3002	5014	5021

Metallic Colours

No.	50	53	57	58
Colour	dark blue	light grey	dark grey	bordeaux
RAL Code	No Ral Code	No Ral Code	No Ral Code	No Ral Code

CAP \ CODE		00	02	03	04	06	08	09	30	32	33	34	38	40	42	50	53	57	58
1A		•	•	•	•	•	•	•											
1B		•	•	•	•	•	•	•											
1C				•			•	•											
1DS		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1ES/1FS		•	•	•	•	•	•	•											
1GAS/1GCS		•	•	•	•	•	•	•											
1H				•				•											
1JS		•	•	•	•	•	•	•											
1KS		•	•	•	•	•	•	•											
1M		•	•	•	•	•	•	•											
1NS				•				•											
1PS		•	•	•	•	•	•	•											
1QS/1RS		•		•				•											
1SS/1LS		•	•	•	•	•	•	•											
1TS/1US/1VS		•		•			•	•											
1WAS/1WDS/1WPS		•		•			•	•	•					•	•		•	•	
1XS		•	•	•	•	•	•	•											
1ZA				•		•		•	•					•	•	•	•	•	•
1ZB				•		•		•	•					•	•	•	•	•	•
1ZCS				•		•	•	•	•					•	•	•	•	•	•
1Z/1ZW		•		•		•	•	•											
10R/10RF + 10Q		•	•	•	•	•	•	•											

The RAL Codes mentioned are the codes nearest to the solid colors in the multimec® range.

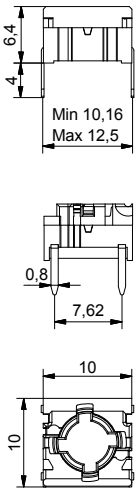
For product updates and/or changes of specifications please see www.mec.dk

- Through-hole (TH) or surface mount (SMD)
- 50mA/24VDC
- Single pole/momentary
- 10,000,000 operations lifetime (NO function)
- Temperature range:
  - Switch: -40/+160°C
  - LED: -40/+85°C
- IP 67 sealing
- Actuation force: 2.0N, 3.5N, 6.5N
- NO or NC/NO

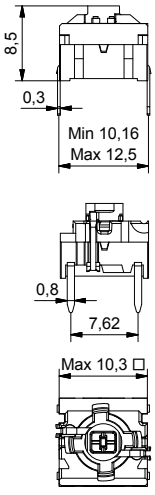
All dimensions in mm *Tolerances -/+0.2mm*

THROUGH-HOLE (TH)

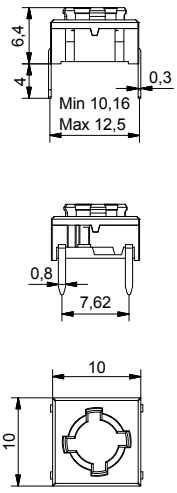
5G



5G illuminated

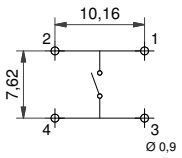


5E

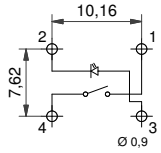


PCB LAYOUT

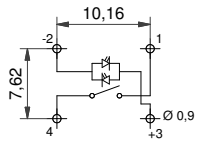
Non-illuminated



1 LED

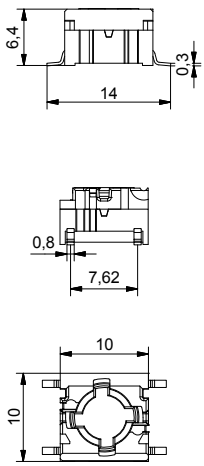


2 LED

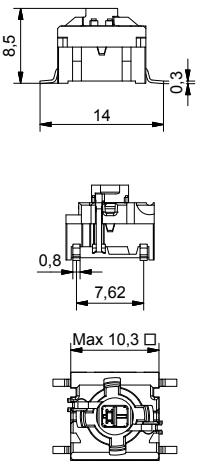


SURFACE MOUNT (SMD)

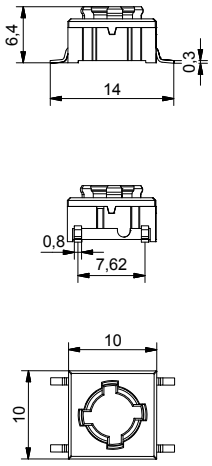
5G



5G illuminated

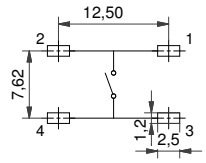


5E

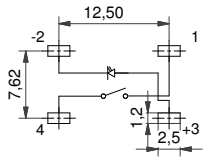


PCB LAYOUT

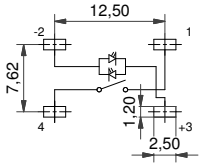
Non-illuminated



1 LED



2 LED

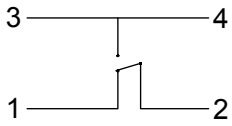


NORMALLY CLOSED/NORMALLY OPEN FUNCTION

NOT FOR SALE IN JAPAN

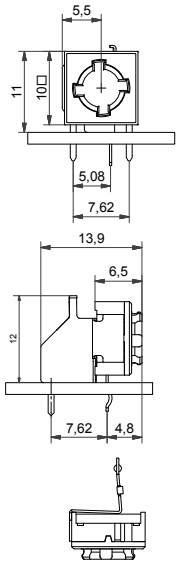
- Available for 5E and non-illuminated 5G in 3.5N actuation force.
- Same PCB layout as the NO 5E and 5G
- Housing colour is **grey**

CIRCUIT DIAGRAM

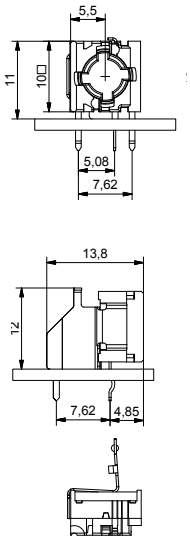


RIGHT ANGLE SWITCHES

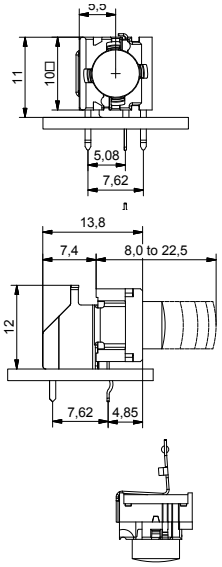
5E



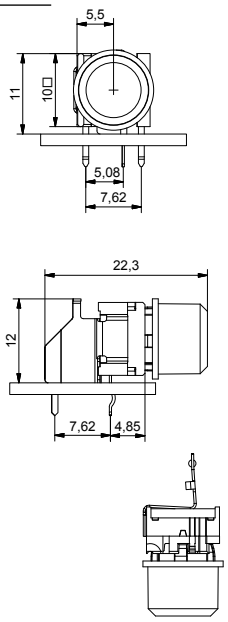
5G



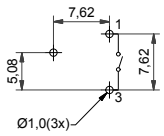
5G + 1SS



5G + 1DS



PCB LAYOUT



multimec® 5 series has only normally open (NO) non-illuminated right angle switch.

ILLUMINATED – HOW TO ORDER

Switch	Mounting	Actuation force	LED		Quiet (optional)
5 G					
	TH9 through-hole	**20**	**02** blue	**82** red	**Q**
	SH9 surface mount	**35**	**22** green	**2242** green/yellow	only for 2.0N
		65	**42** yellow	**8222** red/green	
			61 white	**8242** red/yellow	

NON-ILLUMINATED– HOW TO ORDER

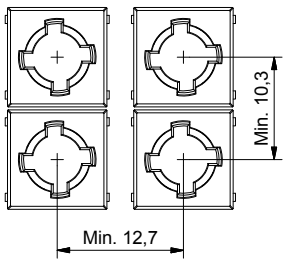
Switch	Mounting	Actuation force	RAS (optional)		NC/NO (only for 3.5N)
5 E					
	TH9 through-hole	**20**	**RAS** right angle switch	**or**	**NCNO** normally closed/ normally open function
	SH9 surface mount	**20Q**			
		35			
		65			

Switch	Mounting	Actuation force	RAS (optional)		NC/NO (only for 3.5N)
5 G					
	TH9 through-hole	**20**	**RAS** right angle switch	**or**	**NCNO** normally closed/ normally open function
	SH9 surface mount	**20Q**			
		35			
		65			

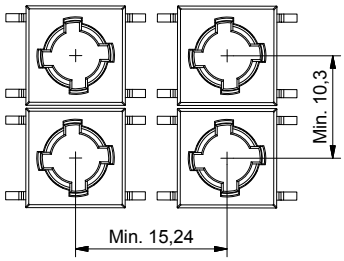
Ordering example: 5ESH935 (non-illuminated), 5GTH9658222 (illuminated), 5GSH935NCNO (normally closed/normally open); 5ETH920RAS (right angle) 5ETH920Q or 5GSH92061Q (quiet versions)
Please see colour codes, updates of products and changes of specifications on www.mec.dk

Basic switch spacing

through-hole (TH)

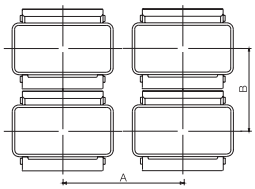


surface mount (SMD)

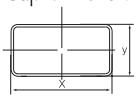


Recommended switch/cap spacing

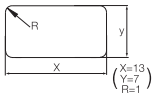
Switch spacing



Cap dimensions

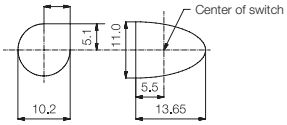


Panel cut-out

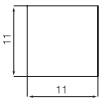


Panel cut-out

1NS 1VS

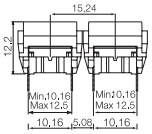


1TS

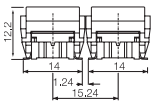


Spacing examples

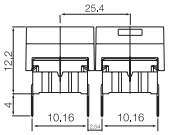
multimec
5GT+1B/C+2C/D



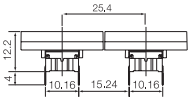
multimec
5GS+1B/C+2C/D



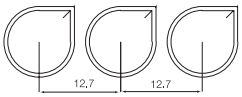
multimec
5GT + 1A/H



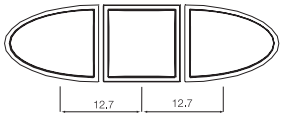
multimec
5GT + 1M



multimec
1NS + 1NS + 1NS



multimec
1VS + 1TS+ 1VS



Cap series	Recommended min. switch spacing AxB	Nominal cap dimension WxH	Recommended min. panel cut-out
1A/1H	12.7x10.16	12.6x10.1	13.0x10.5
1B/1C+2C/2D	15.24x15.24	15.1x15.1	15.5x15.5
1DS/1ES/1FS	12.7x12.7	ø9.6	ø10.0
1GAS	12.7x11.14	ø11	ø11.4
1GCS	15.14x15.14	ø15	ø15.4
1JS	12.7x12.7	ø9.6	ø10.4
1KS/1KBS/1KCS	15.24x15.24	14.3x14.3	14.7x14.7
1M	25.4x10.16	25.0x10.	25.7x10.5
1NS	12.7x12.7	ø9.8/□4.9	ø10.2/□5.1
1PS/1QS/1RS	15.24x10.16	6.5x12.5	7.0x13.0, R max. 1.0
1SS/1IS/1LS	12.7x12.7	ø6.5	ø7.0
1TS	12.7x12.7	10.6x10.6	11.0x11.0
1US	12.7x12.7	ø10.6	ø11.0
1VS	12.7x12.7	10.6x13.25	11.0x13.65
1WAS/1WPS	12.7x10.3	12.5x6.5	12.9x6.9
1WDS	15.34x10.3	15.2x8.0	15.6x8.4
1XS	12.7x12.7	9.4x7.4	9.8x7.9
1YS	17x17	15x15	16x16
1ZA	18.84x10.3	18.7x10.1	19.4x10.5
1ZB	24.34x12.1	R1=7.4; R2=17.5 90°	R1=7.1; R2=17.5-17.75 90°
1ZCS	14.44x14.44	ø14.3	ø14.7
1Z/1ZW	35.5x35.5; 41.6x41.6	ø29.5	ø30.3
10R/10RF/10RM	40.5x40.5	ø30.0	ø30.6
10Q/10QM	32.5x32.5	22x22	22.5x22.5

Tape & Reel

Tape and reel is available for the parts listed and has the following specifications:

Reel diameter:	Ø330mm	Tape and reel material:	antistatic or better
Tape width:	24mm		
Pitch:	see list	Quantity per reel:	see list

3C/3E/5E/5G multimec®tape & reel

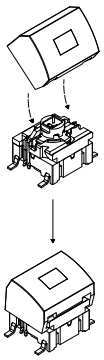
Part No.	Ordering Code	Pitch	Quantity per reel
3CSH9	3CSH9R	16	500
3ESH9	3ESH9R	16	500
5ESH9XX	5ESH9XXR	16	500
5GSH9XX	5GSH9XXR	16	500
5XSH9XX1SSXX-08.0	5XSH9XXR1SSXX-08.0	20	250
5XSH9XX1SSXX-09.5	5XSH9XXR1SSXX-09.5	20	250
5XSH9XX1SSXX-10.4	5XSH9XXR1SSXX-10.4	20	250
5XSH9XX1SSXX-11.0	5XSH9XXR1SSXX-11.0	20	250
5XSH9XX1SSXX-12.0	5XSH9XXR1SSXX-12.0	20	250
All varimec h <12.5; add R after part no.		20	250

illuminated 5G multimec®tape & reel

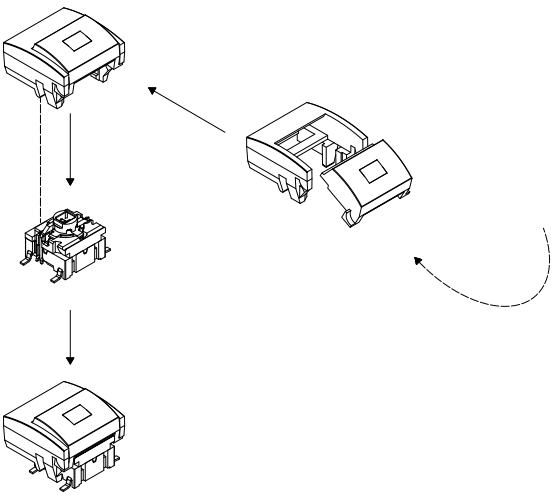
Part No.	Ordering Code	Pitch	Quantity per reel
5GSH9XX02	5GSH9XX02R	20	250
5GSH9XX22	5GSH9XX22R	20	250
5GSH9XX42	5GSH9XX42R	20	250
5GSH9XX61	5GSH9XX61R	20	250
5GSH9XX82	5GSH9XX82R	20	250
5GSH9XX2242	5GSH9XX2242R	20	250
5GSH9XX8222	5GSH9XX8222R	20	250
5GSH9XX8242	5GSH9XX8242R	20	250

How to assemble

multimec®
5GS+1A/H

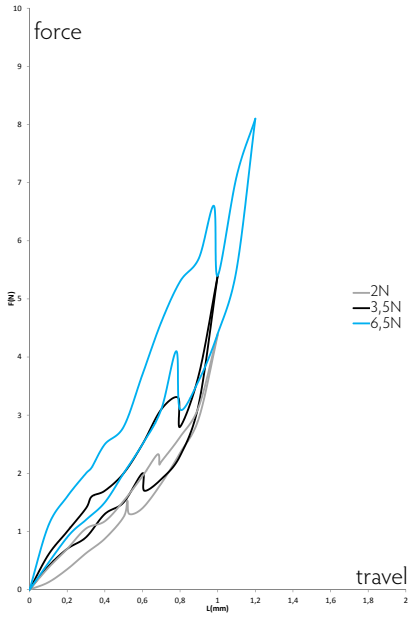


multimec®
5GS+1B/C+2C/D

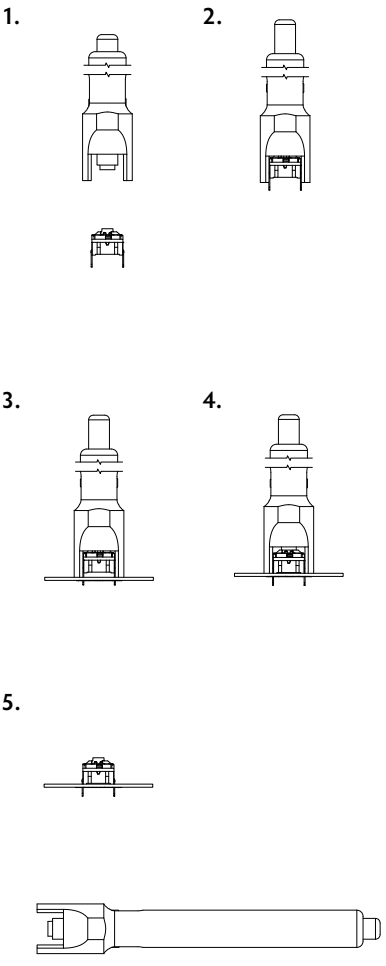


Operating force

(typical example)



Mounting tool for multimec® through-hole switches



Part No. 9861000

RoHS Compatible

	HIGH TEMPERATURE VERSIONS		
	SILVER	GOLD	NC/NO
ELECTRICAL SPECIFICATIONS			
Contact resistance	<30m Ω - typ. 10m Ω		
Insulation resistance	>10M Ω		
Recommended load	0.5-50mA 24VDC	0.5µ-50mA 24VDC	
Contact bounce	<2mS - typically 0.5mS		
MECHANICAL SPECIFICATIONS			
Standard actuation force (switch)	2.0N, 3.5N, 6.5 N		3.5N
Max. Actuation force without cap	115N for 60 sec (according to MIL-PRF-22885H)		100N for 10 sec
Key travel (switch)	1 mm		
Life time (switch)	>10,000,000 cycles		>1,000,000 cycles
TEMPERATURE RANGE			
Working temperature	Min -40°C Max +160°C		
Storage temperature	Min -40°C Max +160°C		
5G with LED (working & storage temp)	Min -30°C Max +85°C		
Soldering (through-hole switch)	IEC 68-2-20 8:		
	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.		
SOLDERING (SMD)	JEDEC J-STD-020C		
ENVIRONMETAL ENDURANCE IEC 68-2-3			
Temperature	+40°C		
Humidity	93% RH		
Duration	56 Days		
TEMPERATURE CYCLING IEC 68-2-14			
Temperature limit	Min -55°C - Max +85°C		
Number of cycles	200		
Exposure time at each temperature	10 min		
Recovery time before measurements	16 hrs		
Sealing IEC 529	IP-67		
Cleaning	Standard methods - see usage guidelines		
MATERIAL SPECIFICATIONS - SWITCHES			
Housing	PPS UL94V0		
Actuator	PPS UL94V0		
Sealing + spring	Silicone rubber		
Contact spring	Stainless steel	Stainless steel	
	+ 3µAg	+ 1µAu	
Fixed contacts	SnCu + 2µNI + 3µAg	SnCu + 2µNI + 1µAu	
Terminals	SnCu + 2µNI + 3µSn100		

Caps, Bezels & Legends – Material Specifications

MATERIAL	PARTS	TEMP. LIMIT	UL RATING
ABS	1A, 1B, 1C, 1DS, 1ES, 1FS, 1H, 1JS, 1KS, 1LS, 1M, 1NS, 1PS, 1QS, 1RS, 1TS, 1US, 1VS, 1WAS, 1WDS, 1WPS, 1XS, 1Z, 1ZA, 1ZB, 1ZCS, 1ZW, 2C, 2D, 2K, reflectors for 1KBS/1KCS and 1YS	Max. 65°C	UL94HB
Polycarbonate	All lenses and transparent colour caps, lids for 1KBS/1KCS	Max. 85°C	UL94HB
Polyamide	1GAS/1GCS, 1SS, 2SS	Max. 160°C	UL94V2
Legends Adhesion	DS/EN ISO 2409 Class 1 & ASTM D3359 Class 4B		

LEDs specifications

5G switches

Colour		Blue	Green	Yellow	White	Red	High Intensity Green
Colour Codes		02	22	42	61	82	29
ABSOLUTE MAXIMUM RATINGS (Ta=25°C)							
Power	mW	95	75	60	48	65	102.5
Current forward	mA	25	30	25	15	25	25
Forward peak current	mA	100	80	60	100	100	150
Voltage reverse	V	5	5	5	NA	12	5
Operating temperature	°C	-40/+85	-55/+85	-40/+85	-40/+85	-30/+85	-40/+85
Storage temperature	°C	-40/+90	-55/+85	-40/+90	-40/+85	-40/+85	-40/+85
Soldering temperature	°C	245 for max. 10 sec					
ELECTRICAL-OPTICAL CHARACTERISTICS (Ta=25°C)							
Voltage forward	Typ. V	3.3	2	1.75**	2.85	2	3.3
	Max. V	3.7	2.4	2.35	3.1	2.5	4.1
Current reverse (VR=5V)	Max. µA	50	100	10	NA	100	50
Wave length	nm	470	571	591	NA	633	525
Spread	Δnm	25	NA	15	NA	16	30
Spread angle	degree	120	130	120	150	160	60
Luminous Intensity	Min. mcd	45	18	28.5	71	28	500
	Typ. mcd	112*	35	72*	224*	180*	1000
Optical intensity	Lm/w	NA	NA	NA	36	7	NA

*Max.mcd **Min. V

3F switches		**3FXXX (for 1E-1F-1N-1Q-1R-1S-1X)**								**3FXXX (for 1K-1T-1U-1V-1W-1WD)**		
Colour		**B**	**G**	**Y**	**W**	**R**	**G/Y**	**R/G**	**R/Y**	**G**	**Y**	**R**
Colour Codes		00	20	40	65	80	2040	8020	8040	24	46	87
Absolute Maximum Ratings	(Ta=25°C)											
Power	mW	105	70	60	120	60	120	100	120	60	60	120
Current forward	mA	30	20	20	25	20	25	30	25	25	25	50
Forward peak current	mA	150	60**	60**	100	60**	150	120	150	60	60	200
Voltage reverse	V	5	3	3	5	3	5	5	5	5	5	5
Operating temperature	°C	-40/+85			-40/+85	-25/+85	-40/+85	-55/+100	-40/+85	-40/+85	-40/+85	-40/+85
Storage temperature	°C	-40/+85			-40/+100	-30/+100	-40/+85	-55/+100	-40/+85	-40/+85	-40/+100	-40/+100
Soldering temperature	°C	260 for max 5 sec					260 for max 2 sec			300 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	3.8	2.0	2.1	2.0	2.1	2.0*	2.0	2.0***
	Max. V	4.5	3.0	3.0	4.3	3.0	2.8	2.6	2.8	2.4*	2.4	2.4***
Current reverse (VR=5V)	µA	10	10	10	50	10	2	2	2	10	10	10
Wave length	nm	466	563	585	NA	650	565/590	630/565	625/590	570	589	624/632
Spread	Δnm	60	40	40	NA	40	35	35	35	10	NA	20
Spread angle	degree	60	45	45	25	45	60	200	60	100	40	40
Luminous Intensity	Min. mcd	18	9.0	5.6	630	5.6	8	2.2	8	70****	630	400****
	Typ. mcd	50	25	16	1000	16	25	4.8	25	20****	1250	800****
Orientation	The longer pin is the anode, the shorter is the cathode. For bicolour LEDs the anode for the first colour (ex. 2080) is the longer pin.											

Pulse width 1ms Duty cycle 1:5, */F =50mA, **** Luminous Flux mlm
B=Blue, G=Green, Y=Yellow, R=Red, W=White
Specifications are subject to change without notice.

Usage guidelines

How to get the best results with MEC Switches?
These guidelines are offered to users of MEC Switches as an aid to ensure successful and reliable switch operation.

Temperature
Both unimec™ and multimec® switches are produced in low and high temperature versions. Please see the technical specifications for details on operating and storage temperatures and soldering guidelines to make sure you select the best switch for your application. When wave soldering is taking place, MEC strongly recommend that the temperature profile is analysed and compared with the temperature rating of the switch. In case of doubt always select the high temperature versions unimec™ 154XX, and multimec® 5XXH9XX. It is also important to monitor the accumulated heat build up from both the pre-heat zones and the solder zone.

Most standard accessories for both unimec™ and multimec® switches are made from ABS plastic with a maximum operating temperature of 65°C. It is strongly recommended that accessories are mounted after soldering of the switch. If this is not possible care must be taken not to overheat the accessories during the soldering process. The 1SS, 1GAS/1GCS and Varimec™ caps are, however, made of high temperature materials and will meet the same temperature specifications as the high temperature switches.

For accessories made from other plastic materials please see multimec® and unimec™ technical specifications.

LEDs have their own temperature specifications. When fitted in a high temperature switch the LED will determine the max. operating temperature, i.e. 5GTH93524 has an upper temperature limit of 85°C! This also applies with 3F switches.

Mounting and Dismounting
If switches are to be mounted in rows it is essential that the recommendations regarding spacing are followed. PC board thickness should be 1.4±0.2 mm and terminal hole diameter should be 0.9mm.

All unimec™ and multimec® caps and bezels are easily snapped onto the switch modules and can be changed at a later time with the exception of the unimec 16.700 cap. The same applies to the 3E caps. Once these caps are installed they are not designed to be removed. To do so may cause damage to the switch and the PC board if not done very carefully. If the 16.300 or 16.700 cap must be removed from a unimec™ alternate action switch, make sure that the switch actuator is in the released, upper position before attempting to remove the cap. This will prevent possible damage to the internal latching pin.

Care must be taken when inserting the 3FT switch and LED assembly into the PC board. Do not press direct on the LED. This will force the LED down into the actuator and risks to cause the switch contacts to remain in the closed position. To correct the fault, the LED must be raised slightly and centered in the actuator to assure unrestricted movement of the actuator. A mounting tool is available for multimec® switches.

Soldering and Cleaning unimec™
Most assembly and field problems experienced by users of unsealed switches are caused by the contamination of the contacts during soldering and cleaning.

Contact contamination may be recognised by an increase in contact resistance and possible intermittent operation of the switch, especially in low power applications. Care must be taken not to submerge the switch in cleaning agents or spray the switch during cleaning. The switch must be protected at all times to prevent contamination by flux or cleaning liquids.

For unimec™ alternate versions we recommend to leave the actuator in the released upper position during soldering. This makes the switch more resistent to overheating.

Soldering and Cleaning multimec®
multimec® switches are fully sealed to IP67 specifications to prevent solder flux and aqueous based cleaning solutions from entering the switch and contaminating the contacts. The switches can be placed on the PC board with other components and wave soldered. multimec® offers a high level of sealing, however, with aqueous solvent solutions care must be taken to avoid the worst case situation with water jets, complete immersion into a liquid with a temperature below the board or surface tension reducing additives.

Recommended cleaning methods are demineralized water. Any surface tension reducing agents, such as soap, must not be used as they risk causing a potential leakage of the switch.

Soldering - Through Hole Versions
Hand soldering: Max. 350°C for max. 3 sec., this applies for both low temperature and high temperature versions.

Wave soldering: heat built up in the switch during pre-heating and soldering must not exceed the maximum operating temperature of the switch. If, for some reason, a high pre-heating temperature is required, MEC recommend the high temperature switches. In any case peak temperature must not exceed 260°C, and soldering time is max 10 sec.

Soldering - Surface Mount Versions
For all methods - infrared, convection and vapour phase. The upper limit 260°C/30 sec must be observed. The soldering temperature profile must have moderate temperature gradients.

RoHS Compliance
As of 1 July 2006 MEC has completed the conversion to RoHS compliance. For more info please see our homepage www.mec.dk

Temperature Limits:

Low temperature switch	115°C
High temperature switch	160°C
LEDs	85/100°C
Accessories	65/85/160°C

Packaging
unimec™ and multimec® switches are packed in rigid tubes of 50 pieces each.

A box contains 1.000 pcs.

The surface mount versions of multimec®switches with a height up to 12.5mm can also be delivered on tape/reel. Each reel contains 250/500 pcs.