202 series

features

- Direct replacement for French Style T1 MF SX3s
- Flat topped LED for enhanced, even illumination of large lens areas
- Water clear lens
- Centre contact anode as standard
- Other voltages and reverse polarity options available
- Pack quantity = 20 pieces

specifications

Typical characteristics (Ta = 25°C)

Part Number	Colour	Voltage DC (Vdc) Vopr	Current DC (mA) Iopr	Luminous Intensity (mcd) Iv at 20mA	Wave Length (nm) λp	Operating Temp. (°C) Topr	Storage Temp. (°C) Tstg	De-rating Graph
202-301-21-38	Red	12	20	39	660	-40 ~ +85^	-40 ~ +85	A
202-325-21-38	Yellow	12	20	87	590	-30 ~ +85^	-40 ~ +120	O
202-324-21-38	Green	12	20	576	525	-30 ~ +85^	-40 ~ +100	R
202-934-21-38	Blue	12	20	128	470	-30 ~ +85^	-40 ~ +100	R
202-998-21-38	Cool White	12	20	414	*	-30 ~ +85^	-40 ~ +100	H
202-301-23-38	Red	24 - 28	11	39	660	-40 ~ +85^	-40 ~ +85	A
202-325-23-38	Yellow	24 - 28	11	87	590	-30 ~ +85^	-40 ~ +120	O
202-324-23-38	Green	24 - 28	11	576	525	-30 ~ +85^	-40 ~ +100	R
202-934-23-38	Blue	24 - 28	11	128	470	-30 ~ +85^	-40 ~ +100	R
202-998-23-38	Cool White	24 - 28	11	414	*	-30 ~ +85^	-40 ~ +100	H

^ = Products must be de-rated according to the de-rating information. Each de-rating graph refers to specific LEDS, please refer to graphs on page 3.

998	* Typical Emission Colour Cool White			
x	0.287	0.283	0.330	0.330
y	0.295	0.305	0.360	0.339

Intensities (Iv) and colour shades of white (x,y co-ordinates) may vary between LEDs within a batch

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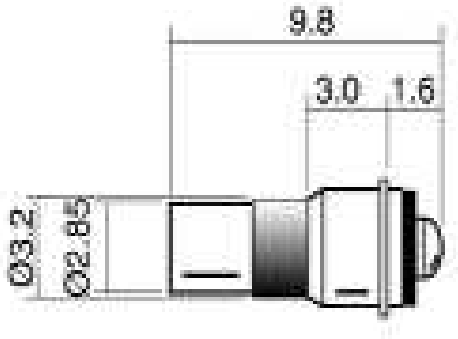
filament replacement leds

202 series

technical data



Dimensions in mm (typical)
Not to scale

Green dot on base of product signifies centre contact cathode -ve
Colour sleeve on product denotes LED colour

Lamp Base Style	Series	Metric Equivalent (mm)	Max. Power Dissipation (mW)
Sub Midget Flange T1 SX3s	202	4	250

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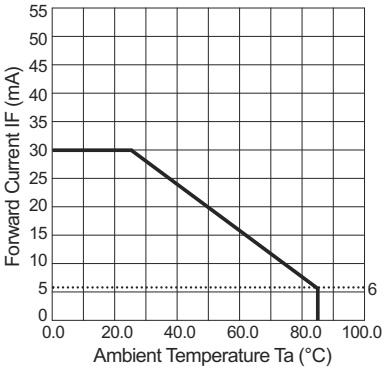
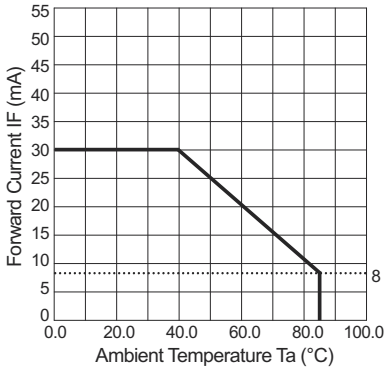
202 series

de-rating information

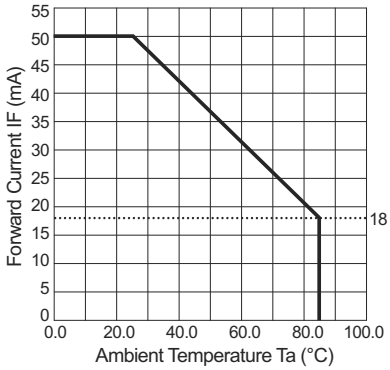
Derating Graph A



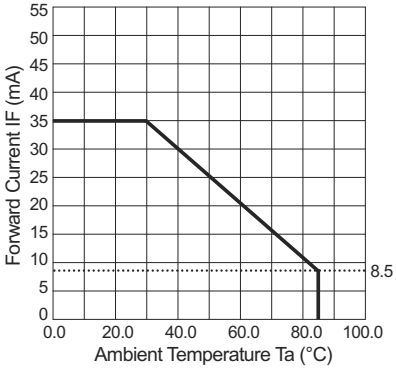
Derating Graph H



Derating Graph O



Derating Graph R



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202 series

also available

Part numbers also available in the 202 series:

Part Number	Colour	Voltage DC (Vdc) Vopr
202-000-04-51	Orange	*10mA
202-301-04-38	Red	*10mA
202-301-20-38	Red	5/6Vdc
202-301-22-38	Red	24Vdc
202-301-22-50	Red	24Vdc
202-301-22-51	Red	24Vdc
202-301-22-52	Red	24Vdc
202-301-24-38	Red	48Vdc
202-301-30-38	Red	5/6Vdc RP
202-301-33-38	Red	28Vdc RP
202-302-23	Red	28Vdc
202-303-22-38	Red	24Vdc
202-303-23	Red	28Vdc
202-303-23-38	Red	28Vdc
202-305-22-38	Red	24Vdc
202-306-23-38	Orange	28Vdc
202-311-22-38	Yellow	24Vdc
202-314-22-38	Green	24Vdc
202-314-23-38	Green	28Vdc
202-314-33-38	Green	28Vdc RP
202-320-22-38	Blue	24Vdc
202-324-04-38	Green	*10mA
202-324-20-38	Green	5/6Vdc
202-324-22-38	Green	24Vdc
202-324-22-50	Green	24Vdc
202-324-22-51	Green	24Vdc
202-324-22-52	Green	24Vdc
202-324-23	Green	28Vdc
202-324-30-38	Green	5/6Vdc RP
202-324-32-50	Green	24Vdc RP
202-324-33-38	Green	28Vdc RP
202-325-04-38	Yellow	*10mA
202-325-20-38	Yellow	5/6Vdc
202-325-22-38	Yellow	24Vdc
202-325-22-50	Yellow	24Vdc
202-325-22-52	Yellow	24Vdc
202-325-30-38	Yellow	5/6Vdc RP
202-325-33-38	Yellow	28Vdc RP
202-350-23-29	Red	28Vdc
202-351-23-29	Yellow	28Vdc
202-352-23-29	Green	28Vdc
202-934-20-38	Blue	5/6Vdc
202-934-22-38	Blue	24Vdc
202-934-22-50	Blue	24Vdc
202-934-22-52	Blue	24Vdc
202-934-30-38	Blue	5/6Vdc RP
202-934-32-38	Blue	24Vdc RP
202-934-33-38	Blue	24Vdc RP
202-991-04-38	Warm White	*10mA
202-991-20-38	Warm White	5/6Vdc
202-991-22-38	Warm White	24Vdc
202-991-23	Warm White	28Vdc
202-991-23-38	Warm White	28Vdc
202-991-33-38	Warm White	28Vdc RP
202-991-34-38	Warm White	48Vdc RP
202-991-42-38	Warm White	15Vdc
202-991-53-50	Warm White	50Vdc
202-998-04-38	White	*10mA
202-998-04-50	White	*10mA
202-998-20-38	White	5/6Vdc
202-998-22-38	White	24Vdc
202-998-22-50	White	24Vdc
202-998-22-52	White	24Vdc
202-998-23-50	White	28Vdc
202-998-23-51	White	28Vdc
202-998-24-38	White	48Vdc
202-998-30-38	White	5/6Vdc RP
202-998-32-38	White	24Vdc RP
202-998-33-38	White	28Vdc RP

The products listed above illustrate all of the options available to order. These products may have custom modifications that alter their operation beyond the generic information contained within this datasheet. Please contact sales for further information.

RP = Reverse polarity
* = These products do not contain an integral resistor

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202 series

design considerations

Single-Chip LEDs
All devices feature water clear high intensity LEDs as standard. The single chip LED devices have been modified by the removal of the domed portion of the encapsulation (flat-topped) to provide even illumination of switches and annunciators. Non flat topped versions are also available.

Product Evaluation
Filament replacement LEDs have been specifically designed to meet the primary objective of providing improved reliability. As this product range is suitable for both new-build and retro-fit, (sometimes in very old systems), a wide range of illuminated push button switches and lamp holders can be encountered. Due to subjectivity, evaluation of the LED type is recommended, (samples of all standard models are available). Care should be taken to correctly simulate operating ambient light conditions to ensure that the correct device has been selected to maximise viewing characteristics such as viewing angle, colour compatibility and on/ off contrast ratio.

Electro-Static Discharge (ESD)
Build up of electro-static discharge occurs in many situations involving people moving and handling products. The range of possible situations is very diverse but voltage levels as high as several thousand volts can and do arise in many individual situations. When an operator charged up to these levels handles a static sensitive device, there is a very probable likelihood that the device will be irreversibly damaged. It is essential that precautions are taken at all stages during manufacture and assembly of these products. Although LEDs were never considered to be static sensitive devices, changes in manufacturing technology and materials used to produce higher intensity products over a large range of the wavelength spectrum have changed this. Marl has an approved system of ESD control from goods in, through production and into final packing and despatch. Marl recommend all users of LED based products follow the guidelines of BS 100015.

Power De-Rating
The forward voltage/ current value of an LED is dependant upon the ambient temperature of the environment in which it is operated. Therefore, care must be taken to operate the LED at the correct voltage/ current values, depending upon the ambient temperature. Consequently, a recommendation regarding operating voltages and currents is given in order to address these temperature effects. This recommendation is termed ‘de-rating’. It is usual for forward voltages and currents to be specified for ambient temperature of 25°C. However, because the values of these qualities vary with temperature, please refer to the de-rating graphs for correct operation. Marl accept no liability for any product that is operated higher than the stated voltage.

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