

203 series



features



- Direct replacement for T1 ¼ Bi-pin
- Flat topped LED for enhanced, even illumination of large lens areas
- Water clear lens
- Improves equipment reliability
- 'Fit & Forget' reliability
- Available in other voltages
- 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 Graphs
203-301-21-38	Red	12	20	39	660	-40 ~ +85 [^]	-40 ~ +85	A
203-325-21-38	Yellow	12	20	87	590	-30 ~ +85 [^]	-40 ~ +120	O
203-324-21-38	Green	12	20	576	525	-30 ~ +85 [^]	-40 ~ +100	R
203-934-21-38	Blue	12	20	128	470	-30 ~ +85 [^]	-40 ~ +100	R
203-998-21-38	Cool White	12	20	414	*	-30 ~ +85 [^]	-40 ~ +100	H
203-301-23-38	Red	24 - 28	11	39	660	-40 ~ +85 [^]	-40 ~ +85	A
203-325-23-38	Yellow	24 - 28	11	87	590	-30 ~ +85 [^]	-40 ~ +120	O
203-324-23-38	Green	24 - 28	11	576	525	-30 ~ +85 [^]	-40 ~ +100	R
203-934-23-38	Blue	24 - 28	11	128	470	-30 ~ +85 [^]	-40 ~ +100	R
203-998-23-38	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, refer to graphs on pages 2 and 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

to order

to order please contact us on: t: +44 (0)1229 582 430
f: +44 (0)1229 585 155 e: sales@marl.co.uk w: www.leds.co.uk

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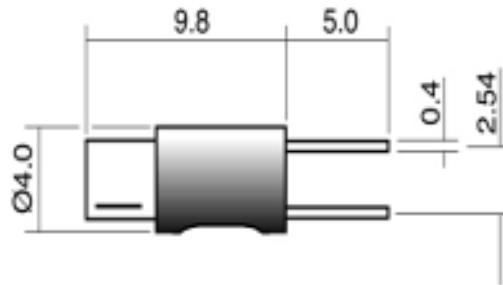


filament replacement leds

203 series



technical data

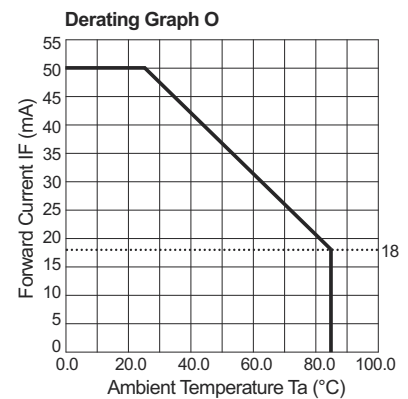
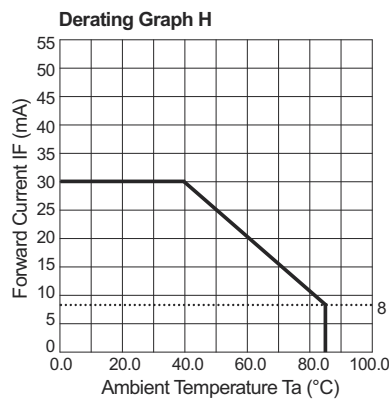
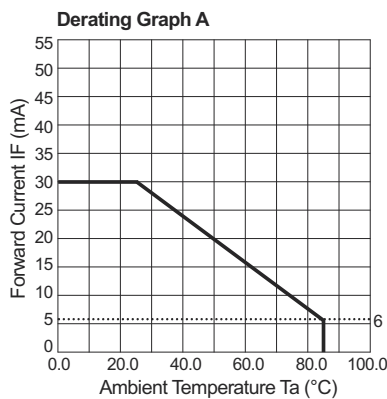


Dimensions in mm (typical)
Not to scale

Resistor lead signifies positive termination + ve
Colour dot on product denotes LED colour

Lamp Base Style	Series	Metric Equivalent (mm)	Max. Power Dissipation (mW)
Sub Miniature Bi-Pin T1 ¼	203	4	250

de-rating information



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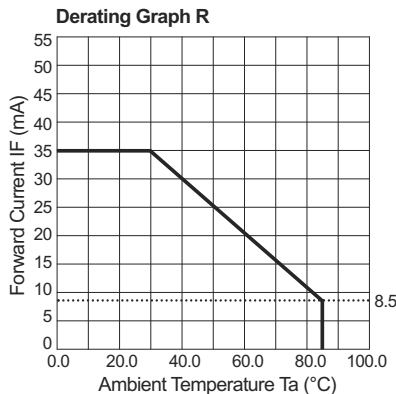
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de-rating information continued



also available

Part numbers also available in the 203 series:

Part Number	Colour	Voltage AC/DC Vopr
203-000-24-50	Orange	48Vdc
203-301-20-25	Red	5/6Vdc
203-301-20-38	Red	5/6Vdc
203-301-22	Red	24Vdc
203-301-22-38	Red	24Vdc
203-301-23-50	Red	28Vdc
203-301-24-38	Red	48Vdc
203-301-42-38	Red	15Vdc
203-301-42-50	Red	15Vdc
203-302-23	Red	28Vdc
203-303-21	Red	12Vdc
203-303-21-38	Red	12Vdc
203-303-23-38	Red	28Vdc
203-305-20-25	Red	5/6Vdc
203-305-20-38	Red	5/6Vdc
203-305-22	Red	24Vdc
203-309-20-25	Yellow	5/6Vdc
203-309-20-38	Yellow	5/6Vdc
203-309-23-38	Yellow	28Vdc
203-309-42-38	Yellow	15Vdc
203-309-42-50	Yellow	15Vdc
203-312-20-25	Green	5/6Vdc
203-312-20-38	Green	5/6Vdc
203-312-21-38	Green	12Vdc
203-312-23-38	Green	28Vdc
203-313-20-38	Green	5/6Vdc
203-313-22-38	Green	24Vdc
203-314-20-25	Green	5/6Vdc
203-314-22-38	Green	24Vdc
203-314-40-50	Green	3Vdc
203-317-23-38	Green	28Vdc
203-324-04-38	Green	*10mA
203-324-20	Green	5/6Vdc
203-324-20-25	Green	5/6Vdc
203-324-20-38	Green	5/6Vdc
203-324-22-38	Green	24Vdc
203-324-23	Green	28Vdc
203-324-23-50	Green	28Vdc
203-324-24-38	Green	48Vdc
203-324-42-38	Green	15Vdc
203-324-42-50	Green	15Vdc
203-325-20-38	Yellow	5/6Vdc
203-325-21-51	Yellow	12Vdc
203-325-22-38	Yellow	24Vdc
203-325-24-38	Yellow	48Vdc
203-325-42-38	Yellow	15Vdc
203-325-42-50	Yellow	15Vdc
203-934-04-38	Blue	*10mA
203-934-20-38	Blue	5/6Vdc
203-934-22-38	Blue	24Vdc
203-934-23	Blue	28Vdc
203-934-23-50	Blue	28Vdc
203-934-24-38	Blue	48Vdc
203-991-04-38	Warm White	*10mA
203-991-20-38	Warm White	5/6Vdc
203-991-21-38	Warm White	12Vdc
203-991-22-38	Warm White	24Vdc
203-998-04-38	White	*10mA
203-998-20	Green	5/6Vdc
203-998-20-38	White	5/6Vdc
203-998-22-38	White	24Vdc
203-998-24-38	White	48Vdc

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.

* = These products do not contain integral resistors

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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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