

FILAMENT REPLACEMENT LEDs - BA9s

FEATURES



**214 SERIES**

PACK QUANTITY = 20 PIECES

- Designed to meet RIA12 specifications
- Direct replacement for T3¼ BA9s incandescent
- Durable to shock and vibration
- Centre contact is Anode (Centre contact Cathode is also available)
- AC Versions available
- Other colours available

SPECIFICATIONS

Ordering Information & Typical Technical Characteristics (Ta = 25°C)

Mean Time Between Failure = 100,000 Hours. Luminous intensity figures refer to the unmodified discrete LED.

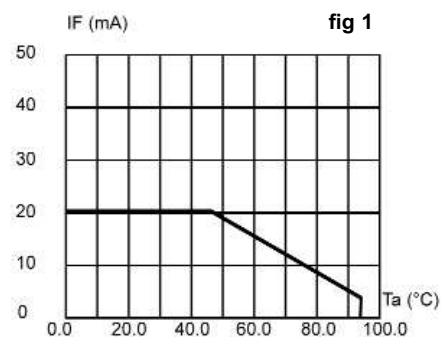
PART NUMBER	COLOUR	LENS	VOLTAGE DC Vopr	CURRENT DC Iopr	LUMINOUS INTENSITY Iv@20mA	WAVE LENGTH λp	OPERATING TEMP Topr	STORAGE TEMP Tstg		
<b>HIGH INTENSITY</b>										
214-501-23-50	Red		Water Clear	28	14	11000	624	-40 ~ +95^	-40 ~ +100	Yes
214-521-23-50	Yellow		Water Clear	28	14	16000	591	-40 ~ +95^	-40 ~ +100	Yes
214-532-23-50	Green		Water Clear	28	14	23000	527	-40 ~ +95^	-40 ~ +100	Yes
<b>UNITS</b>			<b>Vdc</b>	<b>mA</b>	<b>mcd</b>	<b>nm</b>	<b>°C</b>	<b>°C</b>		



Please note that this product is also available in different voltages. Contact our sales department for further details.

^ = Products must be derated when used above 45°C - Refer to **fig 1**.

Warm White LEDs may be used behind coloured lens as a true replacement for a filament lamp.



Max forward DC current vs ambient temperature (Tjmax=105°C)

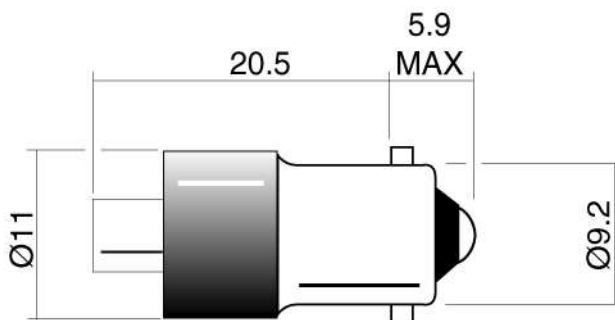
How to Order:

website: [www.marl.co.uk](http://www.marl.co.uk) • email: [sales@marl.co.uk](mailto:sales@marl.co.uk) • webstore: [www.leds.co.uk](http://www.leds.co.uk)

• Telephone +44 (0)1229 582430 • Fax: +44 (0)1229 585155

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## 214 Series



Dimensions in mm (Typical)  
Scale 2 : 1

Green dot on base of product signifies reverse polarity. Colour dot on sleeve denotes LED colour.

## TECHNICAL INFORMATION

Lamp Base Style	Series	Metric Equivalent (mm)	Voltage Range	Maximum Power Dissipation (mW)
Bayonet Automobile Cap T3¼ Ba9s	214	10	28v 15 - 32 Vdc	625

## LENS CHARACTERISTICS

### Single-Chip LEDs

All devices feature water clear high intensity LEDs as standard, which provides even distribution of light output and effective illumination of most lens types. Flat-topping also reduces the 'hot spot' effect, which is generally undesirable.

### Flat-topping

All 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, please contact the Sales Department for details.

## DESIGN CONSIDERATIONS

### 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.

### Power derating

The forward voltage/current value of an LED is dependent upon the ambient temperature of the environment in which it is operated. Therefore care must be taken to operate an 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 quantities vary with temperature, Marl should be contacted if the device is to be operated at a temperature significantly higher than 25°C. Marl accept no liability for any product that is operated higher than the stated voltage.

### Electro-static Discharge (ESD)

Build up of electrostatic 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. We recommend all users of LED based products follow the guidelines of BS 100015.

Note: All luminous intensity figures refer to the unmodified discrete LED.

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