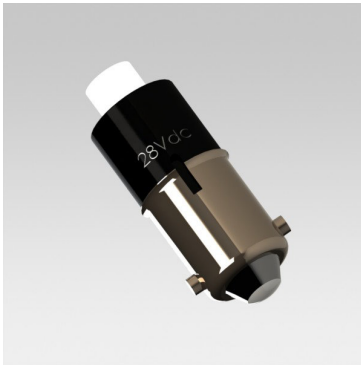


# 215 SERIES

## BULB REPLACEMENT LED



### FEATURES

- T3/4 (BA9s) Bayonet Cap
- Range of LED colour options
- Range of voltage options
- Reverse polarity options available
- Internally potted
- Fit and Forget
- Warm White version available

### BENEFITS

- Direct replacement for standard bulb fitting
- No colour filter required
- Manufactured with internal resistor
- Flexibility for retrofit to reverse polarity installations
- Ideal for high vibration applications
- Outstanding reliability
- Warm White LED may be used behind coloured lens as a true replacement for a filament lamp

Marl Part Number	LED Colour	Typical Voltage Vopr	Typical Current DC Iopr	Typical LED Luminous Intensity	Typical LED Wavelength λp	Operating Temp Topr *	Storage Temp Tstg
215-501-20-38	Red	12Vdc	19	450	660	-40 to +85	-40 to +85
215-521-20-38	Yellow	12Vdc	19	450	595	-40 to +85	-40 to +100
215-532-20-38	Green	12Vdc	19	2150	525	-30 to +85	-40 to +100
215-930-20-38	Blue	12Vdc	19	450	465	-30 to +85	-40 to +100
215-993-20-38	Warm White	12Vdc	19	800	See Below	-30 to +85	-40 to +100
215-997-20-38	Cool White	12Vdc	19	1350	See Below	-30 to +85	-40 to +100
215-501-23-38	Red	24-28Vdc	12-15	250-350	660	-40 to +85	-40 to +85
215-521-23-38	Yellow	24-28Vdc	12-15	200-350	595	-40 to +85	-40 to +100
215-532-23-38	Green	24-28Vdc	11-14	1350-1800	525	-30 to +85	-40 to +100
215-930-23-38	Blue	24-28Vdc	11-14	250-350	465	-30 to +85	-40 to +100
215-993-23-38	Warm White	24-28Vdc	11-14	400-600	See Below	-30 to +85	-40 to +100
215-997-23-38	Cool White	24-28Vdc	11-14	750-1050	See Below	-30 to +85	-40 to +100
215-501-75-38	Red	110Vac	4	100	660	-40 to +85	-40 to +85
215-521-75-38	Yellow	110Vac	4	100	595	-40 to +85	-40 to +100
215-532-75-38	Green	110Vac	4	800	525	-30 to +85	-40 to +100
215-930-75-38	Blue	110Vac	4	150	465	-30 to +85	-40 to +100
215-993-75-38	Warm White	110Vac	4	200	See Below	-30 to +85	-40 to +100
215-997-75-38	Cool White	110Vac	4	400	See Below	-30 to +85	-40 to +100
215-501-76-38	Red	230Vac	2	50	660	-40 to +85	-40 to +85
215-521-76-38	Yellow	230Vac	2	50	595	-40 to +85	-40 to +100
215-532-76-38	Green	230Vac	2	400	525	-30 to +85	-40 to +100
215-930-76-38	Blue	230Vac	2	100	465	-30 to +85	-40 to +100
215-993-76-38	Warm White	230Vac	2	100	See Below	-30 to +85	-40 to +100
215-997-76-38	Cool White	230Vac	2	200	See Below	-30 to +85	-40 to +100
		V	mA	mcd	nm	°C	°C

#### Typical Emission Colours Warm White LED

X	0.4255	0.4390	0.4970	0.4770
Y	0.4000	0.4310	0.4466	0.4137

#### Typical Emission Colours Cool White LED

X	0.296	0.287	0.330	0.330
Y	0.276	0.295	0.339	0.318

### NOTES

Intensities (Iv) and colour shades of white (X-Y co-ordinates) may vary between LEDs within a batch. Additional LED Colours and Voltage Options available for semi-custom projects. Please contact our Sales Team. All LED components are supplied in anti-static packaging.

**DC voltage products in this series do not include a reverse protection diode and must be installed with correct polarity.**

\* Characteristics at Ta = 25°C. For operating temperature derating graphs, please refer to sheet 2.

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# 215 SERIES

## BULB REPLACEMENT LED



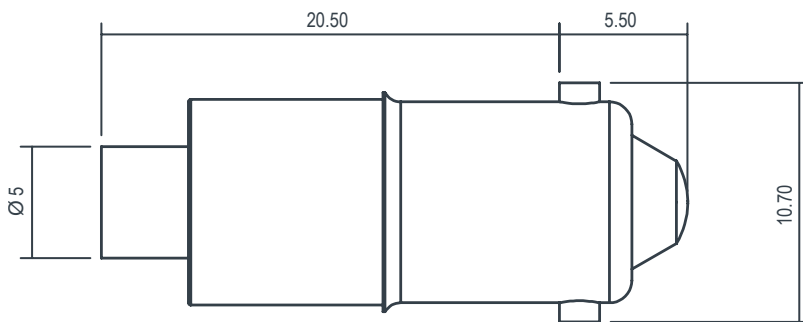
### TECHNICAL DATA

Series	Lamp Base Style	Metric Equivalent	Max. Power Dissipation
215	T3 ¼ Bayonet Automobile Cap	10	625
		mm	mW

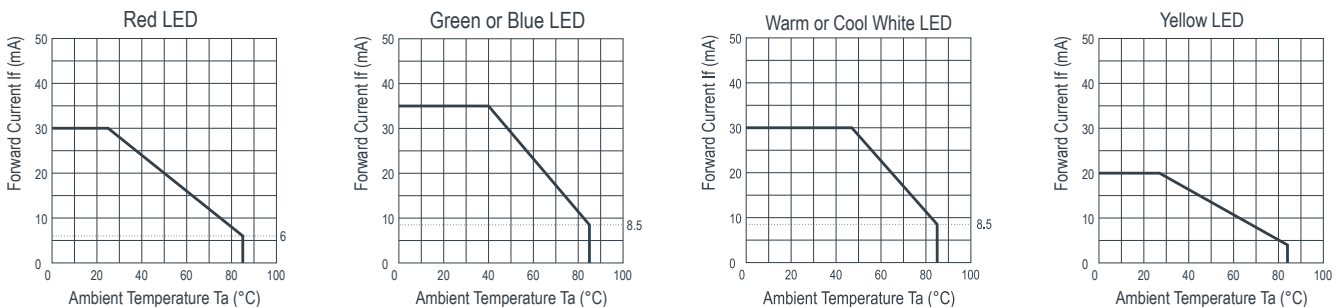
### TECHNICAL DRAWING

Weight (g): 4.2

Dimensions in mm (typical). Not to scale. Green dot on base of product indicates centre contact cathode -ve. Colour dot on product denotes LED colour.



### DE-RATING GRAPHS



### DESIGN CONSIDERATIONS

#### Single-Chip LEDs

All devices feature water clear high intensity LEDs as standard. In devices where discrete LEDs are used, 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. Flat-topping does not apply to devices using surface-mounted device (SMD) LEDs.

#### 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 current BSI guidelines for protection of electronic devices from electrostatic phenomena.

#### Voltage, Current and Temperature

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 the LED at the correct voltage / current values, depending upon the ambient temperature.

Marl should be contacted if the device is to be operated outside the temperature range specified. Marl accept no liability for any product that is operated outside the stated voltage or temperature range.

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