241 SERIES
BULB REPLACEMENT LED

FEATURES

- BA15D base
- Thermal protection (auto dimming)
- Spike and transient protection
- Bi-polar operation
- Beam angle 23°
- Internal potting
- Linear regulation of current
- No electrolytic capacitors or switching inductors
- Originally designed for use on Class 165/166

BENEFITS

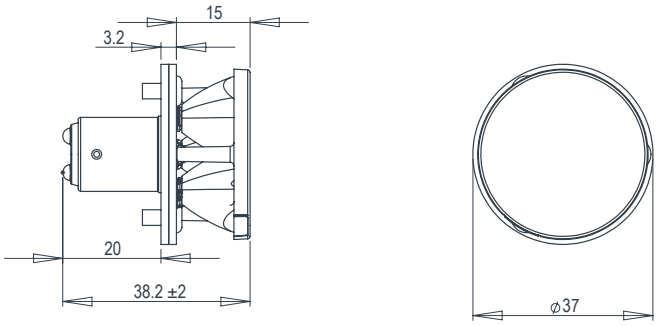
- Direct replacement for 20W halogen bulbs
- Long life 50,000 hours
- High reliability
- Protects against wrong polarity installation
- Suitable for general illumination
- Ideal for high vibration applications
- Zero EMI noise
- Low power <6W

Marl Part Number	LED Colour	Typical Voltage DC Vopr	Typical Current DC Iopr	Typical LED Luminous Flux	Typical Colour Temperature	Operating Temp Topr	Storage Temp Tstg
241-069-97-50	Warm White	8-14	400	230	3000	-40 to +55	-40 to +100
		Vdc	mA	lm	K	°C	°C

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

TECHNICAL DRAWING

Weight (g): 27
Dimensions in mm (typical). Not to scale.



TECHNICAL DATA

Series	Lamp Base Style	Metric Equivalent	Max. Power Dissipation
241	BA15D	15	5.6
		mm	W @ 14Vdc

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 guidelines of BS 100015.

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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