215 series

features

- **Direct replacement for T3 ¼ Bayonet Automobile Cap**
- **Flat topped for enhanced, even illumination of large lens areas**
- **Reverse polarity options available**
- **Ideal for industrial pushbutton switches and annunciator panels**
- **Centre contact Anode as standard**
- **Pack Quantity = 20 Pieces**

specifications

Ordering information and typical characteristics (Ta = 25°C)

Part Number	Colour	Voltage Vac/dc	Current DC (mA)	Luminous Intensity (mcd)	Wave Length (nm)	Operating Temp. (°C)	Storage Temp. (°C)	De-rating Graphs
215-501-21-38		12 Vdc	20					-
215-521-21-38		12 Vdc	20					-
215-532-21-38	Green	12 Vdc	20		525	-30 - +85	-40 - +100	D
215-930-21-38		12 Vdc	20					-
215-997-21-38	White	12 Vdc	20	785	* See below	-30 - +85	-40 - +100	B
215-993-21-38	Warm White	12 Vdc	20	Call	* See below	-30 - +85	-40 - +100	I
215-501-23-38		28 Vdc	14					-
215-521-23-38		28 Vdc	14					-
215-532-23-38	Green	28 Vdc	14		525	-30 - +85	-40 - +100	D
215-930-23-38		28 Vdc	14					-
215-997-23-38	White	28 Vdc	14	785	* See below	-30 - +85	-40 - +100	B
215-993-23-38	Warm White	28 Vdc	14	Call	* See below	-30 - +85	-40 - +100	I

* = Voltage for 20mA product is Vf at 20mA, not Vopr
- 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 2.
- Luminous intensity is measured at 20mA on a discrete LED unless otherwise stated.

to order

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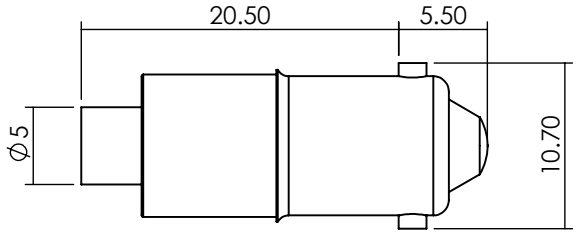
filament replacement leds

215 series

technical data



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

Dimensions in mm (typical)
Not to scale

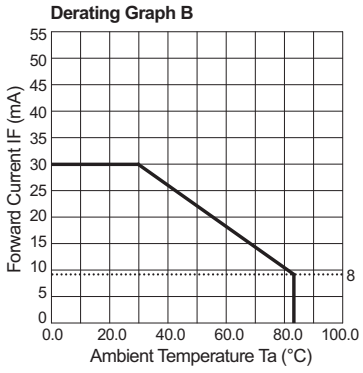
Lamp Base Style	Series	Metric Equivalent (mm)	Max. Power Dissipation (mW)
T3 ¼ Bayonet Automobile Cap	215	10	625

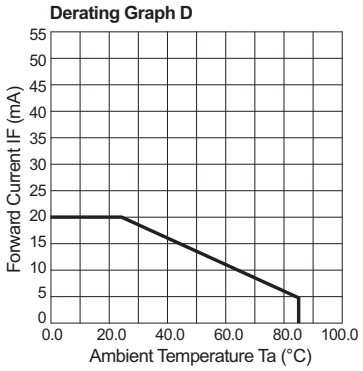
997F	*Typical emission colour White			
x	0.4255	0.4390	0.4680	0.4519
y	0.4000	0.4310	0.4385	0.4086

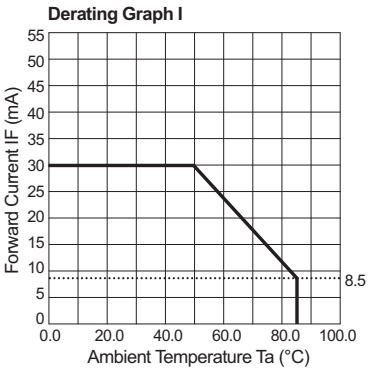
899F	*Typical emission colour Warm White			
x	0.4255	0.4390	0.4680	0.4519
y	0.4000	0.4310	0.4385	0.4086

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

de-rating information







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215 series

also available

Part numbers also available in the 215 series:

Part Number	Colour	Voltage Vopr
215-000-04-50	Red+Blue	20 mA dc
215-501-00-50	-	32 Vac
215-501-00-51	-	150 Vdc
215-501-04-38	-	20 mA dc
215-501-20	Red	5/6 Vdc
215-501-21	Red	12 Vdc
215-501-22-38	-	24 Vdc
215-501-24-38	-	48 Vdc
215-501-25-38	-	110 Vdc
215-501-42-38	-	15 Vdc
215-501-50-38	-	125 Vdc
215-501-72-38	-	24 Vac 50 Hz
215-501-75-38	-	110 Vac 50 Hz
215-501-76-38	-	230 Vac 50 Hz
215-501-77-38	-	125 Vac 50 Hz
215-501-80-38	-	60 Vac 50 Hz
215-501-84-38	-	130 Vac
215-521-00-53	-	160 Vdc
215-521-22-38	-	24 Vdc
215-521-22-50	-	24 Vdc
215-521-22-51	Yellow	24 Vdc
215-521-25-38	-	110 Vdc
215-521-31-38	-	12 Vdc RP
215-521-33-38	-	28 Vdc RP
215-521-75	Yellow	110 Vac 50 Hz
215-521-75-38	-	110 Vac 50 Hz
215-521-76-38	-	230 Vac 50 Hz
215-521-84-38	-	130 Vac
215-527-00-50	Red	1.77 Vdc
215-532-00-51	Green	150 Vdc
215-532-04-38	Green	20 mA dc
215-532-22	Green	24 Vdc
215-532-22-38	Green	24 Vdc
215-532-24-38	Green	48 Vdc
215-532-25-38	Green	110 Vdc
215-532-50-38	Green	125 Vdc
215-532-75-38	Green	110 Vac 50 Hz
215-532-76-38	Green	230 Vac 50 Hz
215-532-77-38	Green	125 Vac 50 Hz
215-532-84-38	Green	130 Vac
215-906-22-38	-	24 Vdc
215-930-20-38	-	5/6 Vdc
215-930-21	Blue	12 Vdc
215-930-22-38	-	24 Vdc
215-930-25-38	-	110 Vdc
215-930-32-38	-	24 Vdc RP
215-930-37-38	-	60 Vdc RP
215-930-41-38	-	8 Vdc
215-930-45-38	-	30 Vdc
215-930-48-38	-	60 Vdc
215-930-75-38	-	110 Vac 50 Hz
215-993-04-38	Warm White	20 mA dc

Part Number	Colour	Voltage Vopr
215-993-22-38	Warm White	24 Vdc
215-993-25-38	Warm White	110 Vdc
215-993-32-38	Warm White	24 Vdc RP
215-993-45-38	Warm White	30 Vdc
215-993-55-38	Warm White	130 Vdc
215-993-75-38	Warm White	110 Vac 50 Hz
215-993-76-38	Warm White	230 Vac 50 Hz
215-993-84-38	Warm White	130 Vac
215-995-22-38	White	24 Vdc
215-997-00-53	White	150 Vdc
215-997-04-38	White	20 mA dc
215-997-22	White	24 Vdc
215-997-22-38	White	24 Vdc
215-997-24-38	White	48 Vdc
215-997-25-38	White	110 Vdc
215-997-27-38	White	220 Vdc
215-997-32-38	White	24 Vdc RP
215-997-33-38	White	28 Vdc RP
215-997-35-38	White	110 Vdc RP
215-997-42-50	Warm White	15 Vdc
215-997-48-38	White	60 Vdc
215-997-50-38	White	125 Vdc
215-997-55-38	White	130 Vdc
215-997-70-38	White	5/6 Vac 50 Hz
215-997-75	White	110 Vac 50 Hz
215-997-75-38	White	110 Vac 50 Hz
215-997-76	White	230 Vac 50 Hz
215-997-76-38	White	230 Vac 50 Hz
215-997-77-38	White	125 Vac 50 Hz
215-997-84-38	White	130 Vac
215-998-25-38	White	110 Vdc

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

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215 series

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.

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, 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.

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