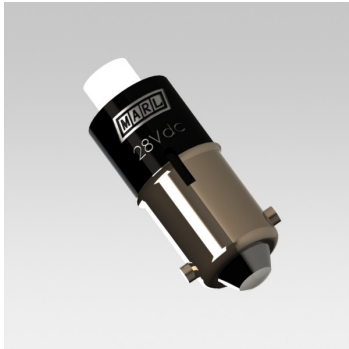


215 series



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	Red	12 Vdc	20	600	600	-40 - +80	-40 - +100	D
215-521-21-38	Yellow	12 Vdc	20	600	585	-40 - +80	-40 - +100	D
215-532-21-38	Green	12 Vdc	20	800	515	-40 - +80	-40 - +100	F
215-930-21-38	Blue	12 Vdc	20	140	465	-30 - +85	-40 - +100	U
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	954	* See below	-20 - +75	-30 - +80	Q
215-501-23-38	Red	28 Vdc	14	600	600	-40 - +80	-40 - +100	D
215-521-23-38	Yellow	28 Vdc	14	600	585	-40 - +80	-40 - +100	D
215-532-23-38	Green	28 Vdc	14	800	515	-40 - +80	-40 - +100	F
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	954	* See below	-20 - +75	-30 - +80	Q

* = 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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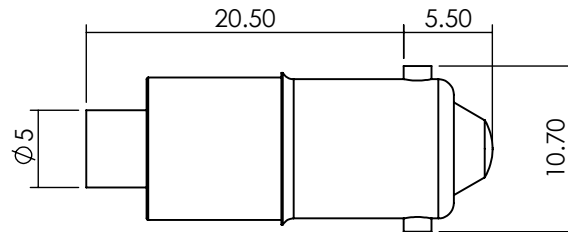


filament replacement leds

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

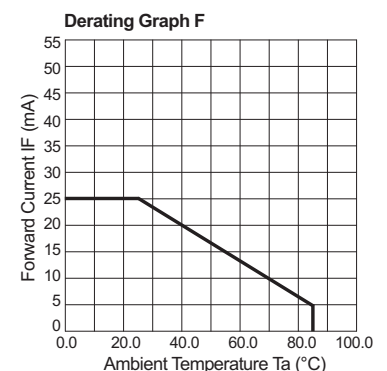
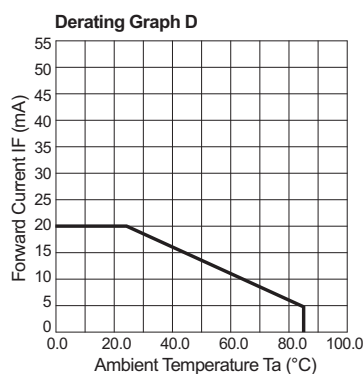
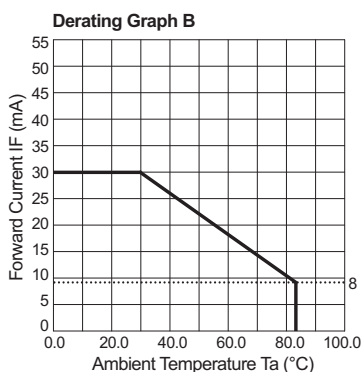
Lamp Base Style	Series	Metric Equivalent (mm)	Max. Power Dissipation (mW)
T3 ¼ Bayonet Automobile Cap	215	10	625

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

993F	*Typical emission colour Warm White			
x	0.4087	0.4608	0.4226	0.3820
y	0.4322	0.4570	0.3775	0.3580

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

de-rating information



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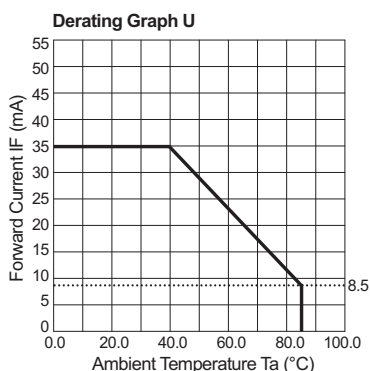
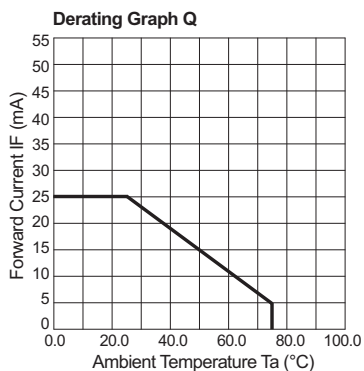
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215 series



de-rating information continued



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215 series



also available

Part numbers also available in the 215 series:

Part Number	Colour	Voltage Vopr	Part Number	Colour	Voltage Vopr
215-000-04-50	Red+Blue	20 mA dc	215-993-32-38	Warm White	24 Vdc RP
215-501-00-50	Red	32 Vac	215-993-45-38	Warm White	30 Vdc
215-501-00-51	Red	150 Vdc	215-993-55-38	Warm White	130 Vdc
215-501-04-38	Red	20 mA dc	215-993-75-38	Warm White	110 Vac 50 Hz
215-501-20	Red	5/6 Vdc	215-993-76-38	Warm White	230 Vac 50 Hz
215-501-21	Red	12 Vdc	215-993-84-38	Warm White	130 Vac
215-501-22-38	Red	24 Vdc	215-995-22-38	White	24 Vdc
215-501-24-38	Red	48 Vdc	215-997-00-53	White	150 Vdc
215-501-25-38	Red	110 Vdc	215-997-04-38	White	20 mA dc
215-501-42-38	Red	15 Vdc	215-997-22	White	24 Vdc
215-501-50-38	Red	125 Vdc	215-997-22-38	White	24 Vdc
215-501-72-38	Red	24 Vac 50 Hz	215-997-24-38	White	48 Vdc
215-501-75-38	Red	110 Vac 50 Hz	215-997-25-38	White	110 Vdc
215-501-76-38	Red	230 Vac 50 Hz	215-997-27-38	White	220 Vdc
215-501-77-38	Red	125 Vac 50 Hz	215-997-32-38	White	24 Vdc RP
215-501-80-38	Red	60 Vac 50 Hz	215-997-33-38	White	28 Vdc RP
215-501-84-38	Red	130 Vac	215-997-35-38	White	110 Vdc RP
215-521-00-53	Yellow	160 Vdc	215-997-42-50	Warm White	15 Vdc
215-521-22-38	Yellow	24 Vdc	215-997-48-38	White	60 Vdc
215-521-22-50	Yellow	24 Vdc	215-997-50-38	White	125 Vdc
215-521-22-51	Yellow	24 Vdc	215-997-55-38	White	130 Vdc
215-521-25-38	Yellow	110 Vdc	215-997-70-38	White	5/6 Vac 50 Hz
215-521-33-38	Yellow	28 Vdc RP	215-997-75	White	110 Vac 50 Hz
215-521-75	Yellow	110 Vac 50 Hz	215-997-75-38	White	110 Vac 50 Hz
215-521-75-38	Yellow	110 Vac 50 Hz	215-997-76	White	230 Vac 50 Hz
215-521-76-38	Yellow	230 Vac 50 Hz	215-997-76-38	White	230 Vac 50 Hz
215-521-84-38	Yellow	130 Vac	215-997-77-38	White	125 Vac 50 Hz
215-527-00-50	Red	1.77 Vdc	215-997-84-38	White	130 Vac
215-532-00-51	Green	150 Vdc	215-998-25-38	White	110 Vdc
215-532-04-38	Green	20 mA dc			
215-532-22	Green	24 Vdc			
215-532-22-38	Green	24 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	Blue	5/6 Vdc			
215-930-21	Blue	12 Vdc			
215-930-22-38	Blue	24 Vdc			
215-930-25-38	Blue	110 Vdc			
215-930-32-38	Blue	24 Vdc RP			
215-930-37-38	Blue	60 Vdc RP			
215-930-41-38	Blue	8 Vdc			
215-930-45-38	Blue	30 Vdc			
215-930-48-38	Blue	60 Vdc			
215-930-75-38	Blue	110 Vac 50 Hz			
215-993-04-38	Warm White	20 mA dc			
215-993-22-38	Warm White	24 Vdc			
215-993-25-38	Warm 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. 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, 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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