202 SERIES
BULB REPLACEMENT LED

FEATURES

- T1 Midget Flange SX3s Base
- Water clear lens
- Flat topped LED
- Centre contact Anode as standard
- Range of LED colour options
- Range of voltage options

BENEFITS

- Direct replacement for standard bulb fitting
- Water clear lens gives clear “off” state
- Flat topping gives even illumination of large lens areas
- Direct replacement for standard polarity installations
- No colour filter required
- Manufactured with internal resistor
- Outstanding reliability

Marl Part Number	LED Colour	Typical Voltage DC Vopr	Typical Current DC Iopr	Typical LED Luminous Intensity	Typical LED Wavelength λp	Operating Temp Topr *	Storage Temp Tstg
202-301-20-38	Red	5-6	20	33	640	-30 to +85	-40 to +85
202-325-20-38	Yellow	5-6	20	401	590	-30 to +85	-40 to +85
202-324-20-38	Green	5-6	20	1010	525	-30 to +85	-40 to +85
202-934-20-38	Blue	5-6	20	225	471	-30 to +85	-40 to +85
202-991-20-38	Warm White	5-6	20	TBC	See Below	-30 to +85	-40 to +85
202-998-20-38	Cool White	5-6	20	1194	See Below	-30 to +85	-40 to +85
202-301-21-38	Red	12	20	33	640	-30 to +85	-40 to +85
202-325-21-38	Yellow	12	20	401	590	-30 to +85	-40 to +85
202-324-21-38	Green	12	20	1010	525	-30 to +85	-40 to +85
202-934-21-38	Blue	12	20	225	471	-30 to +85	-40 to +85
202-991-21-38	Warm White	12	20	TBC	See Below	-30 to +85	-40 to +85
202-998-21-38	Cool White	12	20	1194	See Below	-30 to +85	-40 to +85
202-301-23-38	Red	24-28	15	27	640	-30 to +85	-40 to +85
202-325-23-38	Yellow	24-28	15	308	590	-30 to +85	-40 to +85
202-324-23-38	Green	24-28	15	830	525	-30 to +85	-40 to +85
202-934-23-38	Blue	24-28	15	175	471	-30 to +85	-40 to +85
202-991-23-38	Warm White	24-28	15	TBC	See Below	-30 to +85	-40 to +85
202-998-23-38	Cool White	24-28	15	932	See Below	-30 to +85	-40 to +85
202-301-24-38	Red	48	12	18	640	-30 to +85	-40 to +85
202-325-24-38	Yellow	48	12	208	590	-30 to +85	-40 to +85
202-324-24-38	Green	48	12	615	525	-30 to +85	-40 to +85
202-934-24-38	Blue	48	12	125	471	-30 to +85	-40 to +85
202-991-24-38	Warm White	48	12	TBC	See Below	-30 to +85	-40 to +85
202-998-24-38	Cool White	48	12	648	See Below	-30 to +85	-40 to +85
		Vdc	mA	mcd	nm	°C	°C

Typical Emission Colours Warm White LED				
X	0.433	0.433	0.440	0.440
Y	0.403	0.415	0.423	0.411

Typical Emission Colours Cool White LED				
X	0.296	0.283	0.330	0.330
Y	0.276	0.305	0.360	0.318

NOTES

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.
* For operating temperature derating graphs, please refer to sheet 2.

To order please contact us on +44 (0) 1229 582 430
F +44 (0) 1229 585 155 | E sales@marl.co.uk | www.leds.co.uk
marlleds marlinternationallimited company/marl-international-limited

Q 05480

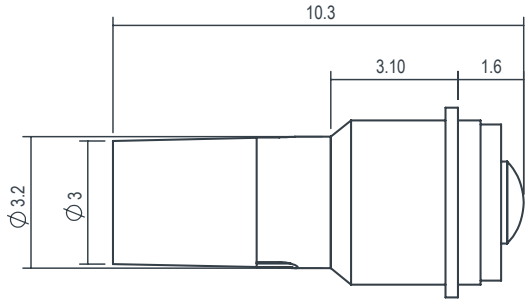
202 SERIES
BULB REPLACEMENT LED

TECHNICAL DATA

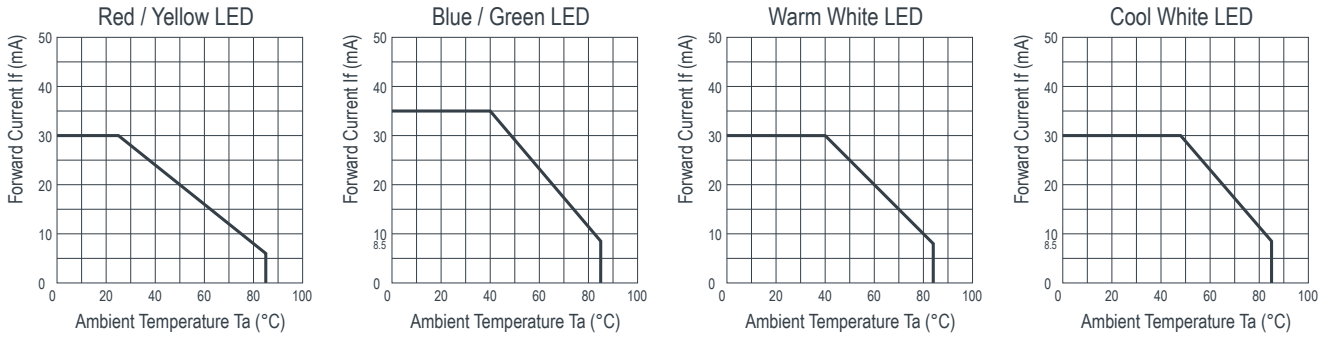
Series	Lamp Base Style	Metric Equivalent	Max. Power Dissipation
202	T1 Sub Midget Flange SX3s	3	360
		mm	mW

TECHNICAL DRAWING

Weight (g): 8.3
Dimensions in mm (typical). Not to scale. Green dot on base of product signifies centre contact cathode -ve. Colour sleeve 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 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.

To order please contact us on +44 (0) 1229 582 430
F +44 (0) 1229 585 155 | E sales@marl.co.uk | www.leds.co.uk
marlleds marlinternationallimited company/marl-international-limited