

## LOW PROFILE LIGHT

### CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application Serial No. 61/248,665, filed October 5, 2009, which is incorporated herein by reference in its entirety.

### BACKGROUND OF THE INVENTION

[0002] The present disclosure relates generally to lighting, particularly to low profile lighting, and more particularly to low profile downlighting for retrofit applications.

[0003] Light fixtures come in many shapes and sizes, with some being configured for new work installations while others are configured for old work installations. New work installations are not limited to as many constraints as old work installations, which must take into account the type of electrical fixture/enclosure or junction box existing behind a ceiling or wall panel material. With recessed ceiling lighting, sheet metal can-type light fixtures are typically used, while surface-mounted ceiling and wall lighting typically use metal or plastic junction boxes of a variety of sizes and depths. With the advent of LED (light emitting diode) lighting, there is a great need to not only provide new work LED light fixtures, but to also provide LED light fixtures that are suitable for old work applications, thereby enabling retrofit installations. One way of providing old work LED lighting is to configure an LED luminaire in such a manner as to utilize the volume of space available within an existing fixture (can-type fixture or junction box). However, such configurations typically result in unique designs for each type and size of fixture. Accordingly, there is a need in the art for an LED lighting apparatus that overcomes these drawbacks.

[0004] This background information is provided to reveal information believed by the applicant to be of possible relevance to the present invention. No admission is necessarily intended, nor should be construed, that any of the preceding information constitutes prior art against the present invention.

#### BRIEF DESCRIPTION OF THE INVENTION

[0005] An embodiment of the invention includes a luminaire having a heat spreader and a heat sink thermally coupled to and disposed diametrically outboard of the heat spreader, an outer optic securely retained relative to at least one of the heat spreader and the heat sink, and a light source disposed in thermal communication with the heat spreader, the light source having a plurality of light emitting diodes (LEDs). The heat spreader, the heat sink and the outer optic, in combination, have an overall height  $H$  and an overall outside dimension  $D$  such that the ratio of  $H/D$  is equal to or less than 0.25. The combination defined by the heat spreader, the heat sink and the outer optic, is so dimensioned as to: cover an opening defined by a nominally sized four-inch can light fixture; and, cover an opening defined by a nominally sized four-inch electrical junction box.

[0006] An embodiment of the invention includes a luminaire having a heat spreader and a heat sink thermally coupled to and disposed diametrically outboard of the heat spreader. An outer optic is securely retained relative to at least one of the heat spreader and the heat sink. A light source is disposed in thermal communication with the heat spreader, the light source having a plurality of light emitting diodes (LEDs). A power conditioner is disposed in electrical communication with the light source, the power conditioner being configured to receive AC voltage from an electrical supply line and to deliver DC voltage to the plurality of LEDs, the power conditioner being so dimensioned as to fit within at least one of: a nominally sized four-inch can light fixture; and, a nominally sized four-inch electrical junction box.

[0007] An embodiment of the invention includes a luminaire having a heat spreader, a heat sink thermally coupled to and disposed diametrically outboard of the heat spreader, an outer optic securely retained relative to at least one of the heat spreader and the heat sink, a light source disposed in thermal communication with the heat spreader, and an electrical supply line disposed in electrical communication with the light source. The heat spreader, heat sink and outer optic, in combination, have an overall height H and an overall outside dimension D such that the ratio of H/D is equal to or less than 0.25. The defined combination is so dimensioned as to: cover an opening defined by a nominally sized four-inch can light fixture; and, cover an opening defined by a nominally sized four-inch electrical junction box.

[0008] An embodiment of the invention includes a luminaire having a housing with a light unit and a trim unit. The light unit includes a light source, and the trim unit is mechanically separable from the light unit. A means for mechanically separating the trim unit from the light unit provides a thermal conduction path therebetween. The light unit has sufficient thermal mass to spread heat generated by the light source to the means for mechanically separating, and the trim unit has sufficient thermal mass to serve as a heat sink to dissipate heat generated by the light source.

[0009] An embodiment of the invention includes a luminaire for retrofit connection to an installed light fixture having a concealed in-use housing. The luminaire includes a housing having a light unit and a trim unit, the light unit having a light source, and the trim unit being mechanically separable from the light unit. The trim unit defines a heat sinking thermal management element, configured to dissipate heat generated by the light source, that is completely 100% external of the concealed in-use housing of the installed light fixture.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Referring to the exemplary drawings wherein like elements are numbered alike in the accompanying Figures, abbreviated in each illustration as “Fig.”:

[0011] Figure 1 depicts an isometric top view of a luminaire in accordance with an embodiment of the invention;

[0012] Figure 2 depicts a top view of the luminaire of Figure 1;

[0013] Figure 2 depicts a bottom view of the luminaire of Figure 1;

[0014] Figure 4 depicts a side view of the luminaire of Figure 1;

[0015] Figure 5 depicts a top view of a heat spreader assembly, a heat sink, and an outer optic in accordance with an embodiment of the invention;

[0016] Figure 6 depicts an isometric view of the heat spreader of Figure 5;

[0017] Figure 7 depicts a partial isometric view of the heat sink of Figure 5;

[0018] Figure 8 depicts a top view of an alternative heat spreader assembly in accordance with an embodiment of the invention;

[0019] Figure 9 depicts a top view of another alternative heat spreader assembly in accordance with an embodiment of the invention;

[0020] Figure 10 depicts a top view of yet another alternative heat spreader assembly in accordance with an embodiment of the invention;

[0021] Figure 11 depicts a bottom view of a heat spreader having a power conditioner in accordance with an embodiment of the invention;

[0022] Figure 12 depicts a section view of a luminaire in accordance with an embodiment of the invention;

[0023] Figure 13 depicts a bottom view of a heat sink having recesses in accordance with an embodiment of the invention;

[0024] Figures 14-18 depict isometric views of existing electrical can-type light fixtures and electrical junction boxes for use in accordance with an embodiment of the invention;

[0025] Figures 19-21 depict a side view, top view and bottom view, respectively, of a luminaire similar but alternative to that of Figures 2-4, in accordance with an embodiment of the invention;

[0026] Figures 22-23 depict top and bottom views, respectively, of a heat spreader having an alternative power conditioner in accordance with an embodiment of the invention;

[0027] Figure 24-26 depict in isometric, top and side views, respectively, an alternative reflector to that depicted in Figures 10 and 12;

[0028] Figure 27 depicts an exploded assembly view of an alternative luminaire in accordance with an embodiment of the invention;

[0029] Figure 28 depicts a side view of the luminaire of Figure 27;

[0030] Figure 29 depicts a back view of the luminaire of Figure 27; and

[0031] Figure 30 depicts a cross section view of the luminaire of Figure 27, and more particularly depicts a cross section view of the outer optic used in accordance with an embodiment of the invention.

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