CMPE2150 SA 07

Heat Sink for T2800D TRIAC

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1. Given that we're using the T2800D to turn on a $10W$ halogen bulb using $24V_{AC}$, what is the expected current when the bulb is fully illuminated? _____ mW.
2. From the "Power Dissipation" figure in the spec sheet for the T2800D, estimate the *maximum* power dissipation for the TRIAC at this current: _____ mW.
3. Use the value given at https://daycounter.com/Calculators/Heat-Sink-Temperature-Calculator.phtml for the TO-220 pack as the value for θ_{JA}. If the ambient temperature is $25°C$, what would the junction temperature be, worst case? _____ $°C$.
4. This would be acceptable in that it wouldn't burn out the TRIAC. However, the case temperature would definitely be hot enough to damage skin. From the specifications for the T2800D , what is θ_{JC} for the T2800D? _____ $°C/W$.
5. What would the case temperature be? _____ $°C$.
6. To lower the temperature, we'll install the heatsink from the CNT Year 2 Kit. You can access its specifications online[1]. What is the thermal resistance specified for this heatsink, in degrees Celsius per watt? _____ $°C/W$. (This number represents θ_{SA}.)
7. For this calculation, assume an θ_{CS} of $0.5°C/W$ for a properly-mounted heat sink. With the heat sink installed and the conditions given above for a fully-illuminated bulb, what would the junction temperature be, if the ambient temperature is $25°C$? _____ $°C$.
8. What would the heat sink temperature be? _____ $°C$.

[1] https://4donline.ihs.com/images/VipMasterIC/IC/AAVT/AAVTS00794/AAVTS00585-1.pdf?hkey=CECEF36DEECDED6468708AAF2E19C0C6

9. This will be warm, but shouldn't pose any safety risk.

   Install the heat sink on your T2800D, and leave it installed for all subsequent activities for which it is used. Here are some directions:

   - The "mica heat pad" is a heat-conducting insulator that should go between the T2800D and the heat sink.
   - Your instructor may supply you with conductive paste—if so, use it very sparingly, and clean up any exposed paste The paste provides the best possible contact between two metal surfaces, as it fills in any gaps or rough surfaces.
   - Use the 4-40 screw and nut from the kit, and tighten using a nut driver for best contact.

For a grade out of two, show your instructor the T2800D with the heatsink installed. If your instructor isn't available, upload a picture instead: _____

Answers

1. 417
2. 500
3. 56.3
4. 2.2
5. 55.2
6. 24
7. 38.4
8. 37.0
9.