

LSC Engineering Technical Document

Document Title:

Dimmer Heat Generation

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Document revision History

Revision	Date	Author	Comments
v2.0	10 June 2021	Richie Mickan	Complete restructure of document format.

Scope:

This document outlines the calculations for the quality of heat generated by LSC branded dimmer and power distribution switch products.

Glossary:

Dimmer	An electronic device used to dim incandescent globes
Smart Switch	An electronic device used to switch full mains power to loads
LED Dimmer	An electronic device specifically designed to dim LED globes
Watt	Unit of measurement of power
BTU	Unit of measurement of energy used in the HVAC industry (British Thermal Unit)

Conversions:

1 BTU/h	=	0.293255 w
1 w	=	3.41 BTU/h

Heat Generation:

The following values are based on measured results of power dissipation and subsequent calculations to determine the watts and BTU/h value. The contribution of control electronics is minimal compared to the dimmer output and so can be ignored.

Heat Generation Table:

Model	Type	BTU/h	Watts
GEN12/10	TruPower dimmer	1,469 BTU/h	431 w
GEN12/16	TruPower dimmer	3,105 BTU/h	911 w
GEN6/25	TruPower dimmer	2,558 BTU/h	711 w
RED6/10	Dimmer	635 BTU/h	186 w
RED12/10	Dimmer	1,269 BTU/h	372 w
RBW6	Dimmer	635 BTU/h	186 w
RBW12	Dimmer	1,269 BTU/h	372 w
RBW24	Dimmer	2,539 BTU/h	745 w
LDT6	LED Dimmer	1,390 BTU/h	408 w
LDT12	LED Dimmer	2,780 BTU/h	815 w
DL3	LED Dimmer	635 BTU/h	186 w
FilmPro610	Dimmer	1023 BTU/h	300 w
FilmPro325	Dimmer	1279 BTU/h	375 w
FilmPro163	Dimmer	1074 BTU/h	315 w
UNITY UIR96+UCM	Cabinet	341 BTU/h	100 w
UNITY UIR48+UCM	Cabinet	171 BTU/h	50 w
UNITY UDM12/10	TruPower dimmer	1,941 BTU/h	569 w
UNITY UDM12/16	TruPower dimmer	3,105 BTU/h	911 w
UNITY UDM6/25	TruPower dimmer	2,426 BTU/h	711 w
UNITY ULM12/6	LED dimmer	3,683 BTU/h	1,080 w
UNITY USM12/10	Smart Switch	409 BTU/h	120 w
UNITY USM12/16	Smart Switch	635 BTU/h	307 w
UNITOUR 48 + UHMT	Cabinet	171 BTU/h	50 w
UNITOUR 24 + UHMT	Cabinet	86 BTU/h	25 w
UNITOUR UDMT12/16	TruPower dimmer	3,105 BTU	911 w
UNITOUR USMT12/16	Smart Switch	1,309 BTU	384 w
APS12/10	Smart Switch	409 BTU/h	120w
APS12/16	Smart Switch	655 BTU/h	192w
APS6/25	Smart Switch	512 BTU/h	150w

LSC TruPower Dimmers:

TruPower is a mechanical bypass function within the dimmer where a relay will bypass the electronic control device (triac/SCR) and the inductor, which are the heat generating devices, when the dimmer is set to 100% output.

This reduces the heat generated by 99% whenever the channels are at 100% output, which is also when the most heat is normally generated.

For the calculation of heat generation in a Trupower dimmer the standard model BTU specification value may be used, but this will be a worst-case scenario, In operation the heat load may be dramatically reduced.

Diversity:

In theatrical use the dimmers are almost never all run at full power at the same time. In normal usage different channels are set to different levels. Some channels may be off, others at varying percentages (e.g. 40%, 60%) and others at full.

It is safe to assume that the BTU output is a linear representation against dimmer power output / load. For example: For a dimmer that is only driven to 75% of its rated load, the heat output of the dimmer is also 75% of the BTU figure quoted for that dimmer.

Whilst it is possible to derate the BTU output of the dimmer system based on the above factors this method could potentially result in excess heat being generated on rare occasions.

It is also common for the incoming mains supply to be rated below the full capacity of the dimmer system. Commonly this diversity factor may be 60-80% of the full rated load. In these situations the heat output *should* also be de-rated to match the diversity factor of the incoming power feed.

Mounting Options:

Racking dimmers into an enclosure does not affect the BTU figure as BTU is a quantity of heat units generated which does not change depending on the mounting system used. However, care must be taken to ensure that any racking or stacking system employed does allow for adequate air flow for heat removal within the dimmers.

Document End.