

## DESCRIPTION

Ozone 70W LED drivers are designed to make LED fixture design easy. With universal input voltage, wide range output and a list of exceptional features, they take the trial and error out of LED fixture design.



## KEY FEATURES

- 120/220-240/277V<sub>AC</sub> Input
- Dimmable Output Current (Constant Amplitude or PWM)
- High Efficiency, Compact Design
- Low Harmonic Distortion
- Low Output Ripple Current
- DALI Compatible (IEC 62386)
- Multiple Device Protections and LEDs Over Temp Protection
- Convection Cooled
- Long Life Time
- Field programmable output features via OZONE-Ptools
- RoHS Compliant



## APPLICATIONS AND BENEFITS

Ozone 70W is designed for directly powering LEDs in Indoor Lighting for Large Areas, Street & Urban Lighting and Industrial lighting.

### Features:

- Intelligent
- Robust Design
- Compact
- WW Safety Approvals

### Benefits:

- Easy to use for the final customer with the Ozone Programming Tool, available as option
- Flexible and suitable for several applications
- Communication through DALI protocol
- Easily integrated into the LED Lamp
- Eases Safety Approval Cycle on final lamp

## MODEL CODING AND OUTPUT RATINGS

Model Number	Rating						
	Pout Max (W)	Vout Min <sup>1</sup> (V <sub>DC</sub> )	Vout Max <sup>1</sup> (V <sub>DC</sub> )	Iout Min <sup>2</sup> (mA)	Iout Max <sup>2</sup> (mA)	Auxiliary Output	Vout <sup>3</sup> NO Load (V <sub>DC</sub> )
<b>RSOZ070-200-Full</b>	70	120	195	350	550	5V <sub>DC</sub> , 3.75W	200
<b>RSOZ070-120-Full</b>	70	60	115	350	1100	5V <sub>DC</sub> , 3.75W	120
<b>RSOZ070-120-DALI</b>	70	60	115	350	1100	NO	120
<b>RSOZ070-60-Full</b>	70	30	56	350	2100	5V <sub>DC</sub> , 3.75W	60
<b>RSOZ070-60-DALI</b>	70	30	56	350	2100	NO	60
<b>RSOZ070-35-Full</b>	70	20	33	1000	2600	5V <sub>DC</sub> , 3.75W	35

**Note 1:** The LED Driver Output Voltage Range depends on the current value set ( $I_{SET}$ ). See also [Current Setting](#) section.

**Note 2:** The Output current value can be set ( $I_{SET}$ ) between Iout min and Iout Max (in 50mA step), by using the Ozone Programming Tools (available as optional). See [Ozone Programming Tool](#) section for more details.

**Note 3:** It represents the Maximum Output Voltage under any condition.

The Purchase Order must specify the Ordering Code showed in the model table.

For example: **RSOZ070-60-Full** for the 60V model with Auxiliary output 5VDC, 3.75W.  
**RSOZ070-60-DALI** for the 60V model without Auxiliary output.

**INPUT SPECIFICATIONS**

Specification	Test Conditions / Notes	Min.	Nominal	Max.	Units
<b>AC Input Voltage</b>	120-250V <sub>AC</sub> for Europe; 120-277V <sub>AC</sub> for USA and Canada	108	120/220-240/277	305	V <sub>AC</sub>
<b>Input Frequency</b>		47	50/60	63	Hz
<b>Input Current</b>	120V <sub>AC</sub> Rated Load	-	-	0.69	A
	230V <sub>AC</sub> Rated Load	-	-	0.34	
	277V <sub>AC</sub> Rated Load	-	-	0.30	
<b>Inrush Current</b>	120V <sub>AC</sub>	-	-	11	A <sub>pk</sub>
	230V <sub>AC</sub>	-	-	21	
	277V <sub>AC</sub>	-	-	26.8	
<b>Power Factor</b>	120V <sub>AC</sub> Rated Load	0.98	-	0.99	
	230V <sub>AC</sub> Rated Load	0.97	-	0.98	
	277V <sub>AC</sub> Rated Load	0.92	-	0.94	
<b>THD</b>	120V <sub>AC</sub> Rated Load	-	-	15	%
	230V <sub>AC</sub> Rated Load	-	-	10	
	277V <sub>AC</sub> Rated Load	-	-	10	
<b>Efficiency</b>	120V <sub>AC</sub> Rated Load	87	-	89	%
	230V <sub>AC</sub> Rated Load	89	-	91	
	277V <sub>AC</sub> Rated Load	90	-	91	
<b>DALI Stand by Power Cons.</b>	120V <sub>AC</sub>	-	-	0.28	W
	230V <sub>AC</sub>	-	-	0.41	
	277V <sub>AC</sub>	-	-	0.50	

**OUTPUT SPECIFICATIONS**

Specification	Test Conditions / Notes	Min.	Nom.	Max.	Units
<b>Output Power Rating<sup>4</sup></b>	All models are Power limited to $P_{TOT}=P_{LED}+P_{AUX}$	-	-	70	W
<b>Output Voltage</b>	RSOZ070-200	120	-	195	V <sub>DC</sub>
	RSOZ070-120	60	-	115	
	RSOZ070-60	30	-	56	
	RSOZ070-35	20	-	33	
<b>Output Current</b>	RSOZ070-200	350	-	550	mA
	RSOZ070-120	350	-	1100	
	RSOZ070-60	350	-	2100	
	RSOZ070-35	1000	-	2600	
<b>Ripple Current</b>	All models measured (I <sub>out_Pk-pk</sub> /RMS)	-	10	-	%
<b>Aux Voltage</b>	Auxiliary Output (Aux) available on “-Full” models only	4.75	5	5.25	V <sub>DC</sub>
<b>Aux Power</b>	Auxiliary Output (Aux) available on “-Full” models only	-	-	3.75	W
<b>Aux Voltage ripple</b>	Auxiliary Output (Aux) available on “-Full” models only	-	150	-	mV
<b>Output Regulation</b>		-	±2	-	%I <sub>out</sub>
<b>Start-up time</b>	With no dimmer connected	-	-	1800	ms

**Note 4:** This limit is applied to the Total Output Power delivered by Ozone. When the Auxiliary output is providing P<sub>AUX</sub>, this power has to be considered in the Total Output Power:  $P_{TOT}=P_{LED}+P_{AUX}$ .

**PROTECTION FEATURES**

Specification	Test Conditions / Notes	Min.	Nom.	Max.	Units
<b>Output Over Voltage</b>	Unit shuts Down and latches off after 4 attempts	-	+2V	-	V
<b>Output Under Voltage</b>	Unit shuts Down and latches off after 4 attempts	-	-2V	-	V <sub>min</sub>
<b>Output Over Load</b>	For 71W < P <sub>TOT</sub> < 80W unit reduce the output current. If P <sub>TOT</sub> > 80W latches off after 4 attempts	71	-	80	W
<b>Output Short-Circuit</b>	Between LED+ and LED-/RTN. Unit latches	-	-	-	-
<b>Output No Load</b>	Unit shuts Down and latches off after 4 attempts	-	-	-	-
<b>Over-Temperature Top Case</b>	Power derating (current reduction) and auto Recovery	-	85	-	°C
<b>Aux Over Voltage</b>	Protected against overvoltage	-	-	-	-
<b>Aux Over Load</b>	Protected against overload	-	-	-	-
<b>Power Limitation (PLED)</b>	RSOZ070-35 and RSOZ070-60 meets power limitation for NEC Class 2 rating	-	-	-	-
<b>Isolation Primary-to-Secondary</b>	Reinforced/double Insulation meets IEC/EN61347-2-13 Class II	-	-	-	-

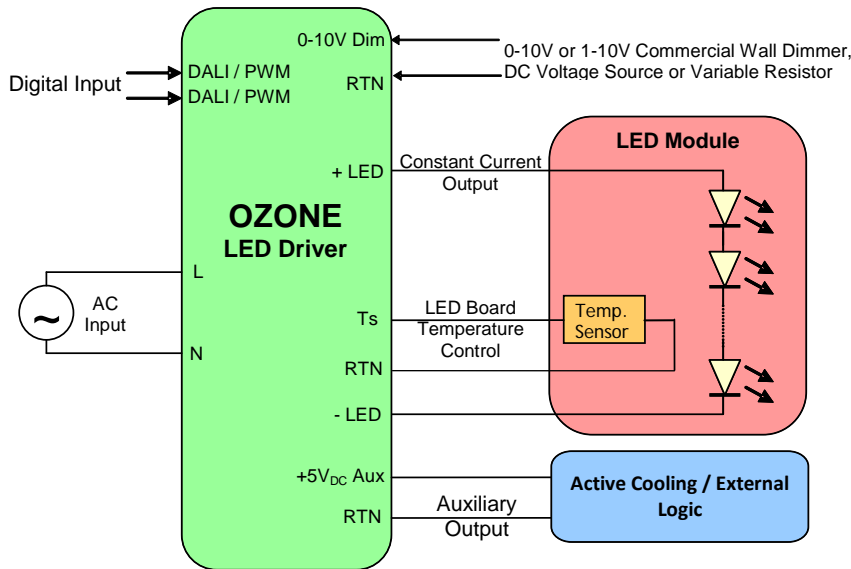
## APPLICATIONS AND CONNECTIONS

The OZONE 70W LED driver is designed for powering LED luminaries with standard lighting controls.

The modules operate with:

- Standard Light Switches
- Analog Dimmers (0-10V / 1-10V control)
- DALI/PWM controls (High Voltage also)

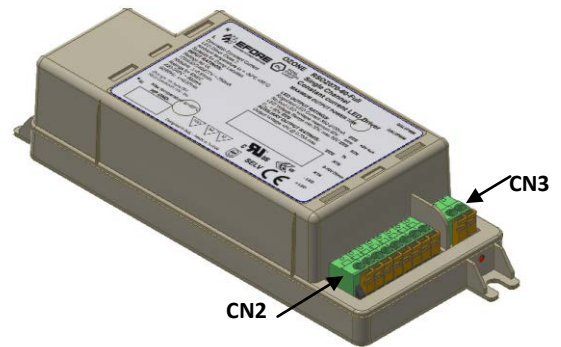
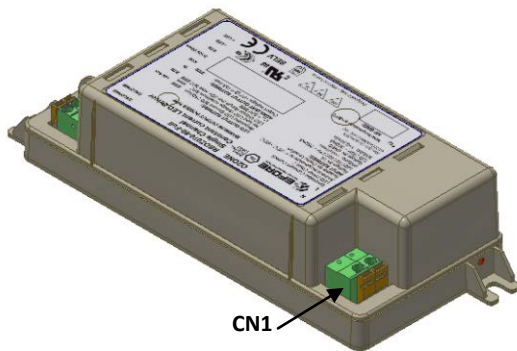
The following diagram depicts a typical installation utilizing the OZONE 70W LED driver:



### OZONE's versatile control features:

- Settable Output Current. Output current value can be set also by the user
- A 2 wire Dimming input provides 10-100% Iout Dimming function.
- A Temperature sensor (NTC thermistor) protects the LED from over-temperature.
- Digital Input allows direct interface with DALI or PWM input controls.
- 5V<sub>DC</sub> AUX can be used to power external logic or auxiliary loads such as active cooling equipment available on "FULL" models only

## INPUT/OUTPUT/CONTROL CONNECTORS



Part	Description	# vie
CN1	AC Main Connector (Line, Neutral)	2
CN2	Output Connector and Controls (LEDs; 0-10V Dimming; Temperature Sense; Auxiliary Output)	8
CN3	DALI or PWM Connector (DALI/PWM, DALI/PWM)	2

See Application Note 1 "[AN1\\_Ozone Wiring Diagram](#)" for wiring and fixing details.



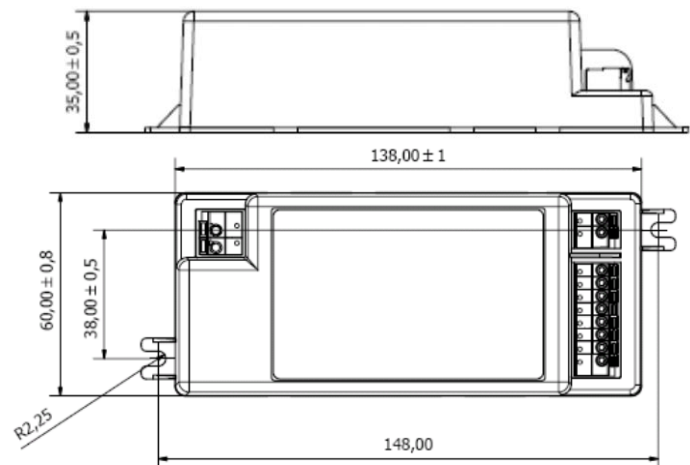
## SIGNAL CONNECTIONS

The following table describes the signal connections of the OZONE 70W LED driver.

ANALOG DIMMING	
<b>0-10V/1-10V Dim</b>	<p>The 0-10V Dim is a dimming input that can be used to dim the output current via a standard commercial wall dimmer (0 to 10V<sub>DC</sub> or 1 to 10V<sub>DC</sub>, IEC/EN 60929), or an external control voltage source (0 to 10V<sub>DC</sub> or 1 to 10V<sub>DC</sub>).</p> <p>The 0-10V Dim input permits dimming from 100% I<sub>SET</sub> to I<sub>dim</sub><sub>MIN</sub> as specified below: I<sub>dim</sub><sub>MIN</sub>=10% I<sub>SET</sub>, while for RSOZ070-60 I<sub>dim</sub><sub>MIN</sub>=50±15mA if I<sub>SET</sub> ≤650mA.</p> <p>When the interface is set for 1-10V dimming, the output current in I<sub>dim</sub><sub>MIN</sub> when the input is &lt; then 1V When the interface is set for 0-10V dimming, the output turns off when the dimming input is &lt;1V.</p> <p>See <a href="#">Application Note 2 "AN2_Ozone Temperature Sense &amp; 0-10V Dimming"</a> for further details.</p>
<b>Temperature Sense (Ts)</b>	<p>The Temperature sense input may be connected to a thermistor (NTC) to realize a LED Board Over Temperature Protection. The thermistor should be located on the LED assembly to monitor its temperature.</p> <p>If the temperature exceeds a predetermined set point, the output current of the driver is automatically reduced to regulate the temperature of the LED Board at a safe level.</p> <p>See <a href="#">Application Note 2 "AN2_Ozone Temperature Sense &amp; 0-10V Dimming"</a> for further details.</p>
<b>Adjustable Dimmer Function</b>	<p>Ozone can be programmed to execute a custom dimming profile consisting of five periods. Requires the use of an external AC photocell.</p> <p>See "<a href="#">UM1_Ozone Toolset Software Manual</a>" for further details.</p>
<b>Constant Light Function</b>	<p>The "Constant Light" function guarantees a constant light flux along the entire product life-cycle, compensating the LED's efficiency loss due to the product aging.</p> <p>See "<a href="#">UM1_Ozone Toolset Software Manual</a>" for further details.</p>
DIGITAL DIMMING	
<b>DALI / PWM</b>	<p>The same Digital Input (<b>DALI/PWM</b>) can be used to control the LED Driver whether DALI Communication or PWM Signal. The selection of the functionality (DALI or PWM) of this input is made by using the Ozone Programming Tools.</p> <p>See also <a href="#">Ozone Programming Tool</a> section.</p> <p><b>DALI:</b> The DALI input can be used to control the output of the LED Driver. It is compatible with DALI Standard IEC 62386 (LED modules, device type 6). DALI stand-by power consumption: &lt;500mW.</p> <p><b>PWM:</b> The PWM input accepts a Pulsed Width Modulated signal. This signal allows a 0% to 100% PWM dimming of the Output Current. This input accepts a Signal compliant to the standard IEC/EN 60929.</p> <p>See <a href="#">Application Note 4 "AN4_Ozone DALI e PWM Dimming"</a> for further details.</p>

## MECHANICAL DETAILS

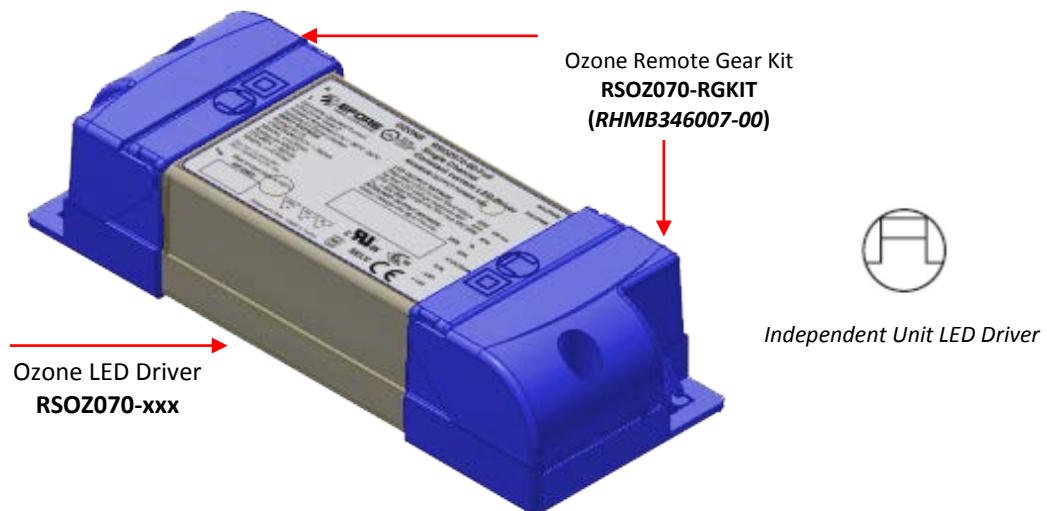
Enclosure Material:	Plastic
Potting:	Yes, half potted
I/O Connections:	Push in connectors
Mounting Details:	2x Fixing holes for screws
Ingress Protection:	IP20
Weight:	345g = 0.76lb
Dimensions:	148 x 60 x 35mm (5.82 x 2.36 x 1.37in)



## OZONE REMOTE GEAR KIT (AVAILABLE AS OPTIONAL)

Ozone 70W LED Driver is designed for embedded use. Ozone Remote Gear Kit is an accessory that can be mounted on the Ozone LED Driver when an Independent Unit LED Driver is required (according to EN61347-2-13).

The Remote Gear Kit is available as an option and can be ordered separately with the code **RSOZ070-RGKIT**. The kit must be ordered separately. It does not come mounted on the LED Driver.



## OZONE PROGRAMMING TOOL (AVAILABLE AS OPTIONAL)

Ozone 70W LED Drivers can be easily set by the customer, for this reason they are extremely flexible and suitable for several applications. For this purpose an external Module (Ozone Programming Tool) is available as optional and can be ordered separately specifying its Ordering Code (See [Note 7](#)).

This external module is designed to be connected to the Ozone LED Driver output. The Programming Tool is powered by a long-life battery; it is safe and easy to use, therefore no particular technical skills are required to set the product.

The Ozone Programming Tool allows you to set the output current value (Current Setting) and to enable other functionalities (Fade Time Setting, DALI/PWM, Adjustable Dimmer, Constant Light Function) (See [Note 8](#)). Moreover, if used in combination with the Ozone Graphical User Interface (Ozone ToolSet PC Software), the Programming Tool allows users access to additional software functions.

Please refer to [Application Note 3 "AN3\\_Ozone Setting"](#) and [User Manual 1 "UM1\\_Ozone Toolset Software Manual"](#) for more details.

**Note 7:** The Ordering Code for the Ozone Programming Tool is **RSOZ070-PTOOL**. The 3-wire programming cable represented in the figure and a USB cable (for PC connection) are included with the Tool.

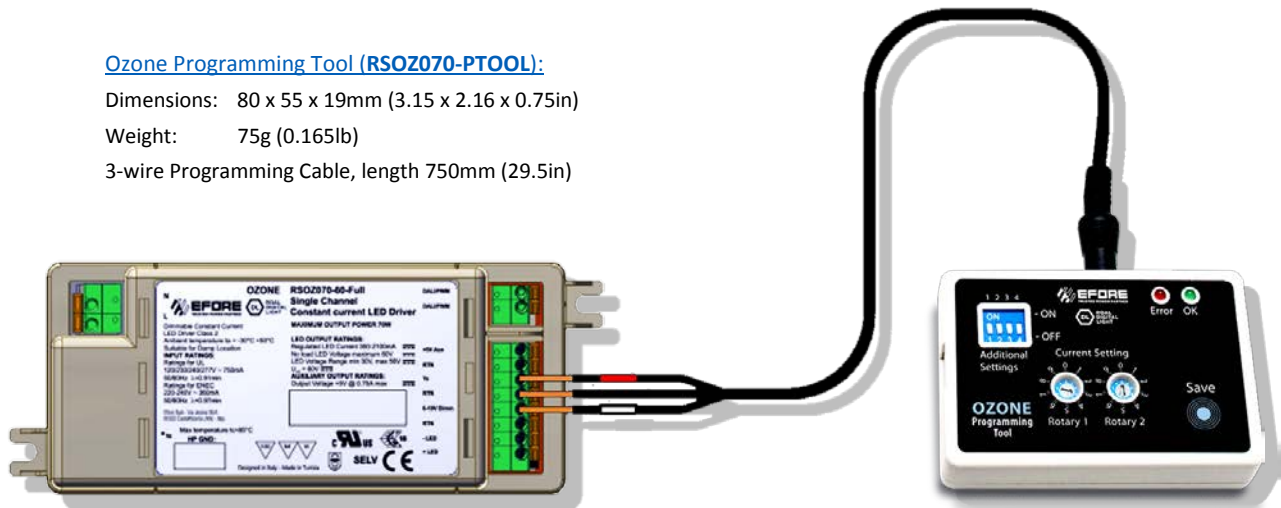
**Note 8:** The Constant Light Function is available starting from Ozone firmware revision 1.4. For a whole overview on the software and product revisions consult the [User Manual 1 "UM1\\_Ozone Toolset Software Manual"](#).

### [Ozone Programming Tool \(RSOZ070-PTOOL\):](#)

Dimensions: 80 x 55 x 19mm (3.15 x 2.16 x 0.75in)

Weight: 75g (0.165lb)

3-wire Programming Cable, length 750mm (29.5in)



Ozone 70W models can be programmed also via DALI programming tool

### [DALI Programming Tool \(RSOZ070-PDALI\):](#)

Dimensions 68 x 35x20mm (2.67x1.37x0.78in)

Weight 75g (0.165lb)

2-wire Programming Cable, length 75mm (29.5in)



Adjustable Dimmer, Constant Light, Driver Diagnostic features can be enabled using either RSOZ070-PTOOL or RSOZ070-PDALI programming tools and the "Ozone Toolset" Software interface. Please refer to "UM1\_Ozone\_Toolset" for further details.

## CURRENT SETTING

The Ozone 70W LED Driver is a Constant Current Output device.

The Current value can be easily set by the customer using the Ozone Programming Tool, by moving 2 rotary switches (R1= Rotary 1, R2=Rotary 2), 10 positions each. The Table below shows the current set values ( $I_{SET}$ ) and the LED Driver Output Voltage Range, according to the positions of the Rotary Switches.

Output Current Set		RSOZ070-35		RSOZ070-60		RSOZ070-120		RSOZ070-200	
$I_{SET}$ mA	Rotary Position R1 - R2	Vout Min <sup>10</sup> V <sub>DC</sub>	Vout Max <sup>10</sup> V <sub>DC</sub>	Vout Min <sup>10</sup> V <sub>DC</sub>	Vout Max <sup>10</sup> V <sub>DC</sub>	Vout Min <sup>10</sup> V <sub>DC</sub>	Vout Max <sup>10</sup> V <sub>DC</sub>	Vout Min <sup>10</sup> V <sub>DC</sub>	Vout Max <sup>10</sup> V <sub>DC</sub>
350 <sup>o</sup>	0-0			30	56	60	115	120	195
400	0-1			30	56	60	115	120	175
450	0-2			30	56	60	115	120	155.6
500	0-3			30	56	60	115	120	140
550	0-4			30	56	60	115	120	127.3
600 <sup>o</sup>	0-5			30	56	60	115	120	127.3
650	0-6			30	56	60	107.7		
700	0-7			30	56	60	100		
750	0-8			30	56	60	93.3		
800	0-9			30	56	60	87.5		
850	1-0			30	56	60	82.4		
900	1-1			30	56	60	77.8		
950	1-2			30	56	60	73.7		
1000	1-3	20	33	30	56	60	70.0		
1050	1-4	20	33	30	56	60	66.7		
1100	1-5	20	33	30	56	60	63.6		
1150	1-6	20	33	30	56				
1200	1-7	20	33	30	56				
1250 <sup>o</sup>	1-8	20	33	30	56				
1300	1-9	20	33	30	53.8				
1350	2-0	20	33	30	51.9				
1400	2-1	20	33	30	50.0				
1450	2-2	20	33	30	48.3				
1500	2-3	20	33	30	46.7				
1550	2-4	20	33	30	45.2				
1600	2-5	20	33	30	43.8				
1650	2-6	20	33	30	42.4				
1700	2-7	20	33	30	41.2				
1750	2-8	20	33	30	40.0				
1800	2-9	20	33	30	38.9				
1850	3-0	20	33	30	37.8				
1900	3-1	20	33	30	36.8				
1950	3-2	20	33	30	35.9				
2000	3-3	20	33	30	35.0				
2050	3-4	20	33	30	34.1*				
2100 <sup>o</sup>	3-5	20	33	30	33.3*				
2150	3-6	20	32.6						
2200	3-7	20	31.8						
2250	3-8	20	31.1						
2300	3-9	20	30.4						
2350	4-0	20	29.8						
2400	4-1	20	29.2						
2450	4-2	20	28.6						
2500	4-3	20	28.0						
2550	4-4	20	27.5						
2600	4-5	20	26.9						

**Note 9:** Ozone 70W LED Drivers are factory pre-set to have the maximum output power in the widest Output Voltage Range.

$I_{SET} = 2100\text{mA}$  for RSOZ070-35  
 $I_{SET} = 1250\text{mA}$  for RSOZ070-60  
 $I_{SET} = 600\text{mA}$  for RSOZ070-120  
 $I_{SET} = 350\text{mA}$  for RSOZ070-200.

**Note 10:** Care should be taken during the design phase to assure the alignment between the Total Forward Voltage of the LED string (Vf total) when the Output is not dimmed and the LED Driver Output Voltage Range (Vout min, Vout max).

The value (VF total @ NO dimming) has to be within the Output Voltage Range (Vout min, Vout max), considering also Vf modifications due to thermal effects and Vf tolerance.

Please note that when dimming is present the Driver works also below its Vout min. In the conditions marked with (\*) the Driver is still within the spec. but consider that they are difficult to maintain by the LED string due to the Vf variation caused by thermal effects and Vf tolerance.


**ENVIRONMENTAL**

Specification	Test Conditions / Notes	Min	Nominal	Max	Units
Top Case Temperature Range	Refer to the Top Case measurement point	-30	-	85	°C
Ambient Temperature Range	Without any derating	-30	-	50	°C
Storage Temperature		-40	-	85	°C
Operating Relative Humidity	Non-condensing	5	-	95	%
Cooling	Convection cooled				
Shock EN 60068-2-27	Operating: Half sine, 30 g, 18 ms, 3 axes, 6x each (3 positive and 3 negative). Non-Operating: Half sine, 50 g, 11 ms, 3 axes, 6x each (3 positive and 3 negative).				
Vibration EN 60068-2-64	Operating: 5 – 500Hz, 1gRMS (0.02 g <sup>2</sup> /Hz), 3 axes, 30 min. Non-Operating: 5 – 500Hz, 2.46gRMS (0.0122 g <sup>2</sup> /Hz), 3 axes, 30 min.				
Vibration EN 60068-2-6	Operating Sine, 10 – 500Hz, 1g, 3 axes, 1 oct/min., 60 min.				
MTBF	Full Load, 40°C Ambient, 80% Duty cycle, Telcordia SR-332 Issue 2	-	400.000	-	Hours
Useful Life	Nominal V <sub>AC</sub> , 40°C Ambient.	-	47.000	-	Hours






**ELECTROMAGNETIC COMPATIBILITY (EMC) – EMISSIONS**

Phenomenon	Conditions / Notes	Standard	Performance Class
Conducted Emission	Test at 230V <sub>AC</sub>	EN55015	
Radiated Emission	Test at 230V <sub>AC</sub>	EN55015	
Conducted and Radiated Emission	Test at 120/277V <sub>AC</sub>	FCC CFR47- part 15/subpart B	Class B
Harmonic Current Emissions		EN61000-3-2	Class C
Voltage Changes, Fluctuation and Flicker		EN61000-3-3	


**ELECTROMAGNETIC COMPATIBILITY (EMC) – IMMUNITY**

Phenomenon	Conditions / Notes	Standard	Note
Equipment for general lighting purposes -EMC Immunity Req.		EN 61547	
ESD (Electrostatic Discharge)		EN 61000-4-2	
Radiated Radio-Frequency electromagnetic field		EN 61000-4-3	
Electric Fast Transient / Burst		EN 61000-4-4	
Surge	Level ±4.0kV L-N	EN 61000-4-5	
Conducted disturbances induced by Radio-Frequency fields		EN 61000-4-6	
Voltage Dips, short interruptions and Voltage Variations		EN 61000-4-11	
Non repetitive damped oscillatory transient, Ring wave	2.5kV	ANSI C.62.41	Category A

**SAFETY AGENCIES APPROVALS**

Certification Body	Safety Standards	Category
	UL Recognized ANSI / UL8750, CSA C22.2 No.250 Models with output voltages <60 V <sub>DC</sub> include UL and CSA approval (cURus) as LED Driver Class 2 output. LED Driver suitable for dry and damp location	
	IEC/EN 61347-2-13 electronic control gear for LED Modules IEC/EN 62384 DC or AC supplied electronic control gear for LED modules – Performance Requirements	
	To obtain the “CE Declaration of Conformity” please contact <a href="mailto:info@efore.com">info@efore.com</a>	
	Independent unit as per EN61347-2-13 <u>with an optional remote gear kit RSO2070-RGKIT</u>	




**OZONE CORRELATED DOCUMENTS AND SOFTWARE**

This document is the *Ozone 70W LED driver Datasheet*. The file is called “[DS1\\_Ozone LED Driver 70W](#)”.

During the Ozone adoption, additional documentation (KPD, Application Notes, User Manual and Software) is provided in order to fully understand the features and proper operation of the product.

Please contact EFORE Sales Department or your local Distributor if one of the following files is needed.

KPD	File Name	Topics
1	<a href="#">KPD1_Ozone LED Driver 70W</a>	Key Performance Data (Efficiency and PF curves, ripple data, inrush current data, “out of range” operations)
Application Note	File Name	Topics
1	<a href="#">AN1_Ozone Wiring Diagram</a>	Wiring Connections and LED Driver fixing
2	<a href="#">AN2_Ozone Temperature Sense &amp; 0-10V Dimming</a>	LED Board Over Temperature protection and 0-10V or 1-10V Dimming
3	<a href="#">AN3_Ozone Setting</a>	LED Driver Settings through the Ozone Programming Tool
4	<a href="#">AN4_Ozone DALI &amp; PWM Dimming</a>	DALI/PWM Digital Input: Control through the DALI standard communication and PWM Dimming
User Manual	File Name	Topics
1	<a href="#">UM1_Ozone Toolset Software Manual</a>	Additional LED Driver Settings via SW, Adjustable Dimming Function, Constant Light Function
PC Software	File Name	Topics
1	<a href="#">Ozone Toolset</a>	PC Software (Windows XP SP3/Windows Vista / Windows 7) to define Additional LED Driver Settings, Adjustable Dimming Function, Constant Light Function

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