

## MAIN FEATURES

- 120/220-240/277 V<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



## 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.

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

<sup>1</sup> The LED Driver Output Voltage Range depends on the current value set (I<sub>SET</sub>). See also Current Setting section.

<sup>2</sup> The Output current value can be set (I<sub>SET</sub>) between I<sub>out</sub> min and I<sub>out</sub> Max (in 50mA step), by using the Ozone Programming Tools (available as optional). See Ozone Programming Tool section for more details.

<sup>3</sup> 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 5 V<sub>DC</sub>, 3.75 W.  
**RSOZ070-60-DALI** for the 60V model without Auxiliary output.

## INPUT SPECIFICATIONS

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

## OUTPUT SPECIFICATIONS

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

<sup>4</sup> 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<sub>TOT</sub> = P<sub>LED</sub> + P<sub>AUX</sub>.

## PROTECTION FEATURES

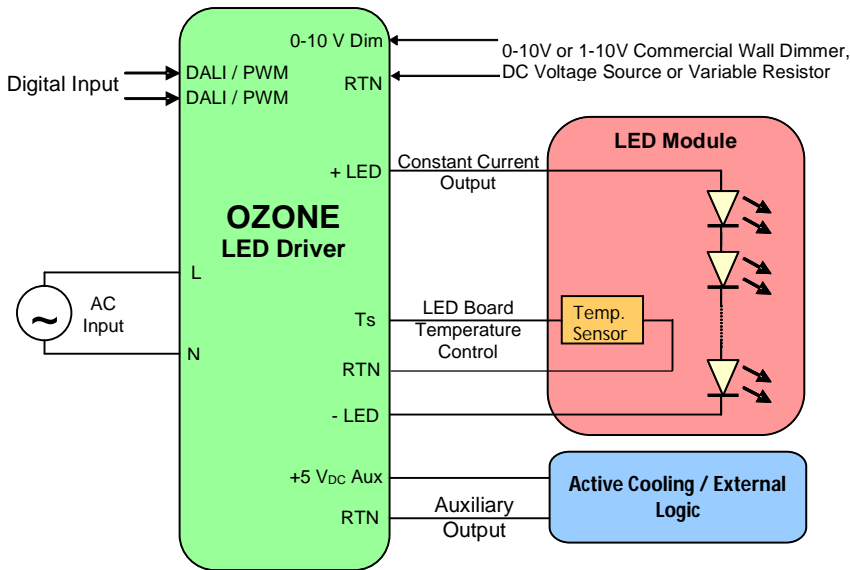
Specification	Test Conditions / Notes	Min.	Nom.	Max.	Units
Output Over Voltage	Unit shuts Down and latches off after 4 attempts	-	+2V	-	V
Output Under Voltage	Unit shuts Down and latches off after 4 attempts	-	-2V	-	V <sub>MIN</sub>
Output Over Load	For 71 W < P <sub>TOT</sub> < 80 W unit reduce the output current. If P <sub>TOT</sub> > 80 W latches off after 4 attempts	71	-	80	W
Output Short-Circuit	Between LED+ and LED-/RTN. Unit latches	-	-	-	-
Output No Load	Unit shuts Down and latches off after 4 attempts	-	-	-	-
Over-Temperature Top Case	Power derating (current reduction) and auto Recovery	-	85	-	°C
Aux Over Voltage	Protected against overvoltage	-	-	-	-
Aux Over Load	Protected against overload	-	-	-	-
Power Limitation (PLED)	RSOZ070-35 and RSOZ070-60 meets power limitation for NEC Class 2 rating	-	-	-	-
Isolation Primary-to-Secondary	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 (0-10 V / 1-10 V control)
- DALI/PWM controls (High Voltage also)

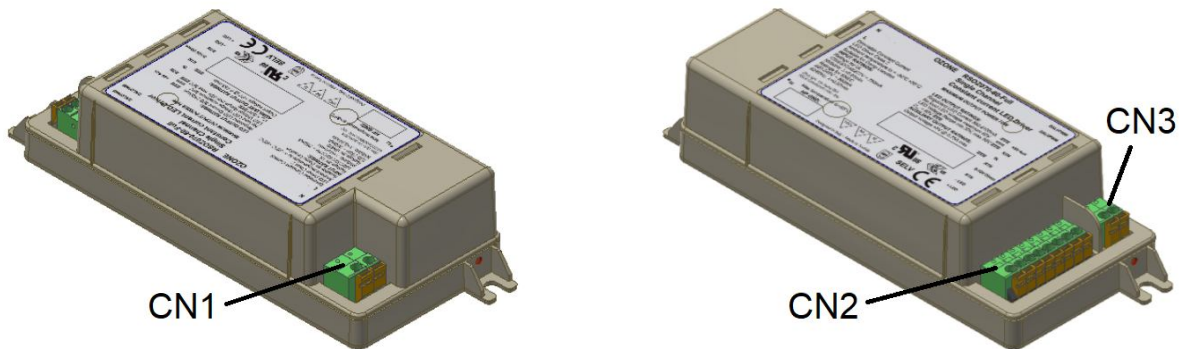
The following diagram depicts a typical installation utilizing the OZONE 70W LED driver:



### 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 %  $I_{out}$  Dimming function.
- A Temperature sensor (NTC thermistor) protects the LED from over-temperature.
- Digital Input allows direct interface with DALI or PWM input controls.
- 5 V<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; 0-10 V Dimming; Temperature Sense; Auxiliary Output)	8
CN3	DALI or PWM Connector (DALI/PWM, DALI/PWM)	2

See Application Note "AN1\_Ozone Wiring Diagram" for wiring and fixing details.

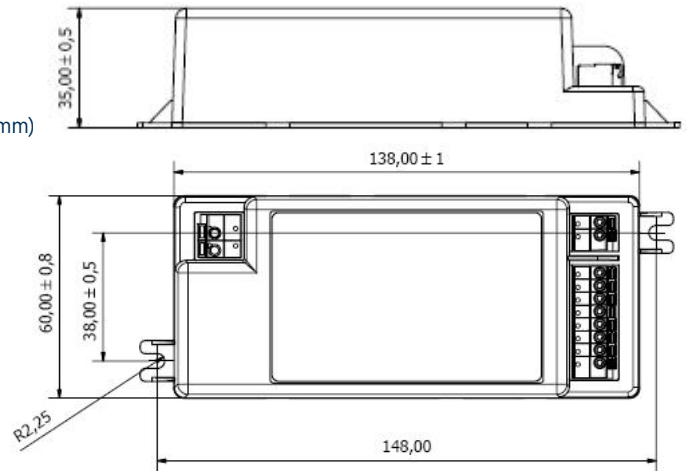
## SIGNAL CONNECTIONS

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

ANALOG DIMMING	
<b>0-10V/1-10V Dim</b>	<p>The 0-10 V Dim is a dimming input that can be used to dim the output current via a standard commercial wall dimmer (0 to 10 V<sub>DC</sub> or 1 to 10 V<sub>DC</sub>, IEC/EN 60929), or an external control voltage source (0 to 10 V<sub>DC</sub> or 1 to 10 V<sub>DC</sub>).</p> <p>The 0-10 V 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>
<b>Temperature Sense (Ts)</b>	<p>See Application Note “<b>AN2_Ozone Temperature Sense &amp; 0-10V Dimming</b>” for further details. 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. 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>
<b>Adjustable Dimmer Function</b>	<p>See Application Note “<b>AN2_Ozone Temperature Sense &amp; 0-10V Dimming</b>” for further details. Ozone can be programmed to execute a custom dimming profile consisting of five periods. Requires the use of an external AC photocell.</p>
<b>Constant Light Function</b>	<p>See “<b>UM2_Ozone Toolset Software Manual</b>” for further details. 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 “<b>UM2_Ozone Toolset Software Manual</b>” 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 Ozone Programming Tool 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 Application Note “<b>AN4_Ozone DALI e PWM Dimming</b>” for further details.</p>

## MECHANICAL DETAILS

Enclosure Material:	Plastic
Potting:	Yes, half potted
I/O Connections(*):	Push in connectors (Φ 0.5 ÷ 1.0 mm; strip wire to 10 mm)
Mounting Details:	2x Fixing holes for screws
Ingress Protection:	IP20
Weight:	345 g (0.76 lb)
Dimensions:	148 x 60 x 35 mm (5.82 x 2.36 x 1.37 in)

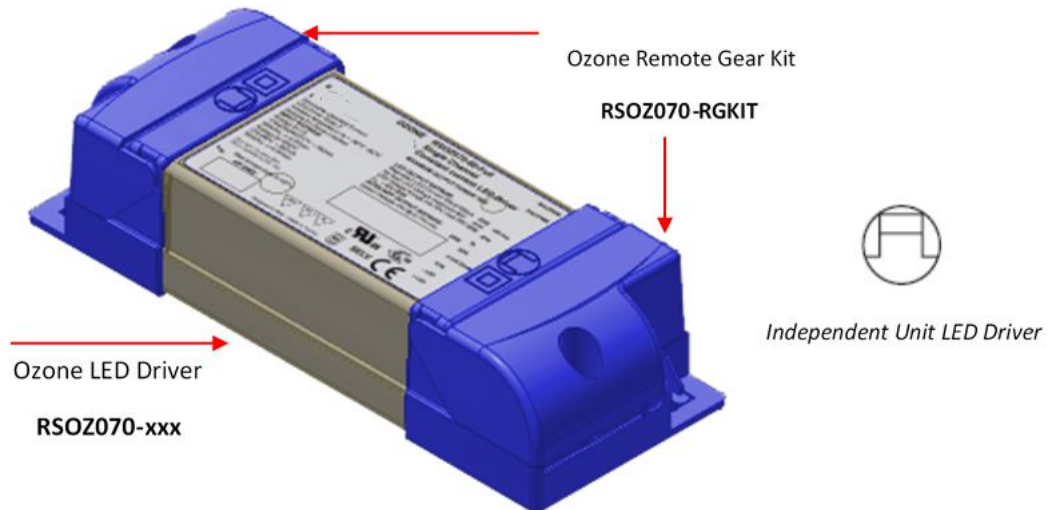


(\*): For European applications (ENEC), connect live parts with harmonized cables, according to the standard H03VVH02-F, H05VVH2-F or equivalent harmonized standards.

## 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<sup>5</sup>.

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)<sup>6</sup>. 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 "**AN3\_Ozone Setting**" and User Manual "**UM2\_Ozone Toolset Software Manual**" for more details.

<sup>5</sup> 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.

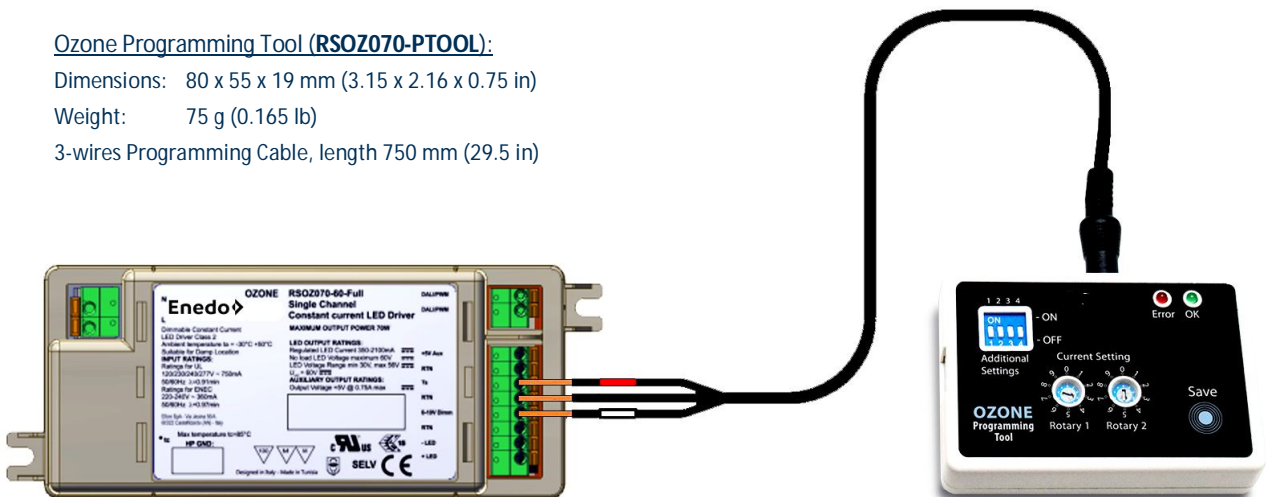
<sup>6</sup> The Constant Light Function is available starting from Ozone firmware revision 1.4. For a whole overview on the software and product revisions consult the User Manual "**UM2\_Ozone Toolset Software Manual**".

### Ozone Programming Tool (RSOZ070-PTOOL):

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

Weight: 75 g (0.165 lb)

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



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

### DALI Programming Tool (RSOZ070-PDALI):

Dimensions: 68 x 35 x 20 mm (2.67 x 1.37 x 0.78 in)

Weight: 75 g (0.165 lb)

2-wires Programming Cable, length 750 mm (29.5 in)



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 "**UM2\_Ozone Toolset Software Manual**" 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 $I_{SET}$ mA	Rotary Position R1 - R2	RSOZ070-35		RSOZ070-60		RSOZ070-120		RSOZ070-200	
		$V_{OUT Min}^8$ $V_{DC}$	$V_{OUT Max}^8$ $V_{DC}$	$V_{OUT Min}^8$ $V_{DC}$	$V_{OUT Max}^8$ $V_{DC}$	$V_{OUT Min}^8$ $V_{DC}$	$V_{OUT Max}^8$ $V_{DC}$	$V_{OUT Min}^8$ $V_{DC}$	$V_{OUT Max}^8$ $V_{DC}$
350 <sup>7</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>7</sup>	0-5			30	56	60	115		
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>7</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>7</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						

<sup>7</sup> Ozone 70W LED Drivers are factory pre-set to have the maximum output power in the widest Output Voltage Range.

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

<sup>8</sup> Care should be taken during the design phase to assure the alignment between the Total Forward Voltage of the LED string ( $V_F$  total) when the Output is not dimmed and the LED Driver Output Voltage Range ( $V_{OUT min}$ ,  $V_{OUT max}$ ).

The value ( $V_F$  total @ NO dimming) has to be within the Output Voltage Range ( $V_{OUT min}$ ,  $V_{OUT max}$ ), considering also  $V_F$  modifications due to thermal effects and  $V_F$  tolerance.

Please note that when dimming is present the Driver works also below its  $V_{OUT min}$ . 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  $V_F$  variation caused by thermal effects and  $V_F$  tolerance.

## ENVIRONMENTAL

Specification	Test Conditions / Notes	Min	Nominal	Max	Units
Top Case Temperature Range	Refer to the Top Case measurement point (Tc)	-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 230 V <sub>AC</sub>	EN55015	
Radiated Emission	Test at 230 V <sub>AC</sub>	EN55015	
Conducted and Radiated Emission	Test at 120/277 V <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.250.13 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@enedopower.com">info@enedopower.com</a>	
	Independent unit as per EN61347-2-13 <u>with an optional remote gear kit RSOZ070-RGKIT</u>	



## OZONE CORRELATED DOCUMENTS AND SOFTWARE

This document is the Ozone 70W LED driver Datasheet. The file is called “**DS\_Ozone 70W Series**”.

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 ENEDO Sales Department or your local Distributor if one of the following files is needed.

Application Note	File Name	Topics
1	AN1_Ozone Wiring Diagram	Wiring Connections and LED Driver fixing
2	AN2_Ozone Temperature Sense & 0-10V Dimming	LED Board Over Temperature protection and 0-10 V or 1-10 V Dimming
3	AN3_Ozone Setting	LED Driver Settings through the Ozone Programming Tool
4	AN4_Ozone DALI & PWM Dimming	DALI/PWM Digital Input: Control through the DALI standard communication and PWM Dimming
User Manual	File Name	Topics
1	UM2_Ozone Toolset Software Manual	Additional LED Driver Settings via SW, Adjustable Dimming Function, Constant Light Function
PC Software	File Name	Topics
1	Ozone Toolset	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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