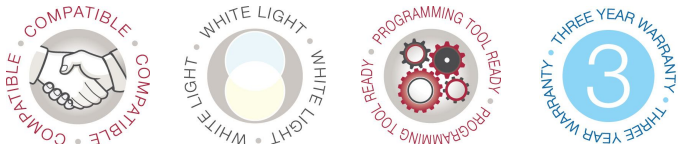
ROAL living energy

Ozone LED Drivers
with Universal Input and Output
70W Total Output Power, Single Channel

Features

Ozone 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.

- Universal Input Voltage: 120Vac / 240Vac / 277Vac
- Constant Current Output for Powering LEDs Directly
- High Efficiency, Compact Design
- Low Harmonic Distortion, Low Output Ripple Current
- Field Programmable Output Current
- DALI Compatible (IEC 62386)
- Dimmable Output Current (Linear or PWM Dimming)
- Multiple Device Protections and LEDs Over Temperature Protection
- Convection Cooled, Wide Operative Temperature Range
- Long Life
- ROHS Compliant



Applications and Benefits

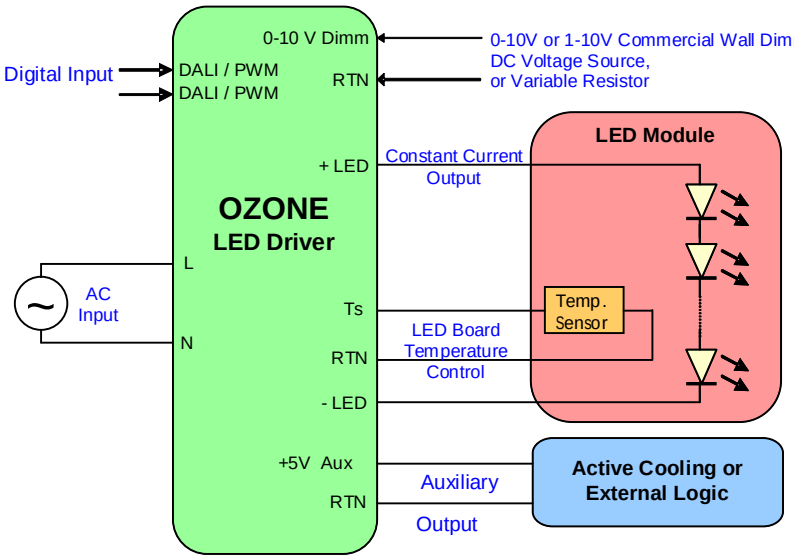
Ozone is designed for directly powering LEDs in Indoor Lighting for Large Areas, Street & Urban Lighting and Industrial lighting.

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
- Long Life Time
- Easily integrated into the LED Lamp
- Eases Safety Approval Cycle on final lamp



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 PWM input or DALI controls
- 5V AUX can be used to power external logic or auxiliary loads such as active cooling equipment (***SynJet*®** *LED Coolers from Nuventix)*

digitallight

Input and Output Specification

	Model RSOZ070-35-Full	Model RSOZ070-60-Full	Model RSOZ070-120-Full	Model RSOZ070-200-Full
Input Characteristics				
Nominal Input Voltage	120 Vac / 240 Vac / 277 Vac			
Input Voltage Range	90Vac to 305Vac			
Input Voltage Frequency	47Hz to 63Hz			
PFC	>0.9 with Pout down to 30% Pmax @ 120Vac >0.9 with Pout down to 50% Pmax @ 230Vac >0.9 with Pout down to 80% Pmax @ 277Vac			
Total Harmonic Distortion Current THD	<20% @any nominal Input Voltage, full load			
Inrush current @ 277 Vac (typ) (Ipeak, half value time)	< 25A, 400 µs			
Typ. Efficiency @ Max output Voltage, full load	0.87@120Vac 0.89@230Vac 0.89@277Vac	0.88@120Vac 0.90@230Vac 0.90@277Vac	0.89@120Vac 0.91@230Vac 0.91@277Vac	0.89@120Vac 0.91@230Vac 0.91@277Vac
Isolation	Reinforced/double insulation meets IEC/EN61347-2-13 Class II			
Output Characteristics (LEDs)				
Power Limitation (P LED)	Meets power limitation for NEC Class 2 rating		Not Applicable	
Output Voltage	From 20 to 33Vdc	From 30 to 56Vdc	From 60 to 115Vdc	From 120 to 195Vdc
Output Current Setting	From 1000 to 2600mA (in 50mA steps)	From 350 to 2100mA (in 50mA steps)	From 350 to 1100mA (in 50mA steps)	From 350 to 550mA (in 50mA steps)
Output Current regulation	+/- 2% of the current set value (Iset)			
Ripple Current	<30% (P-P) of the current set value (Iset)			
Protections	NO Load Protection, Output Over Voltage Protection, Over LOAD Protection, Output Under Voltage Protection, Over Current and Short-Circuit Protection, Device Over-Temperature protection with current reduction and auto recovery; Soft start for LED Board hot plug; LED Board Over Temperature Protection; See also LED Driver Controls section for details.			
Auxiliary Output (Aux)				
+5V Aux	A +5V Auxiliary output provides power for active LED cooling. Vout Aux from 4.75 to 5.25 Vdc Output Vaux Ripple: 150 mVpk-pk P Aux = 3.75 W maximum Protected against overload and over voltage ***Compatible with Nuventix MR16, PAR20, PAR25, PAR30, and PAR38 SynJet Coolers***			
Total Output Power P Tot= P LED + P Aux	P Tot = 70W maximum (See **Note 1**)			

Note 1: This limit is applied to the Total Output Power delivered by Ozone. When the Auxiliary output is providing P Aux, this power has to be considered in the Total Output Power: P Tot = P LED + P Aux.

LED Driver Controls

	Model RSOZ070-35-Full	Model RSOZ070-60-Full	Model RSOZ070-120-Full	Model RSOZ070-200-Full
Standard Output Controls				
0-10V Dimm	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 10Vdc or 1 to 10Vdc, IEC/EN 60929), or an external control voltage source (0 to 10Vdc or 1 to 10Vdc). • The 0-10V Dimm input permits dimming from 100%Iset to Idim min as specified below See Application Note 2 "AN2_Ozone Temperature Sense & 0-10V Dimming" for further details.			
	Idim min=10%Iset	Idim min=50±15mA if Iset ≤ 650mA. Idim min=10%Iset if Iset > 650mA	Idim min=10%Iset	Idim min=10%Iset
Temperature Sense Ts	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. See Application Note 2 "AN2_Ozone Temperature Sense & 0-10V Dimming" for further details.			
Adjustable Dimmer function	Ozone can be programmed to execute a custom dimming profile consisting of five periods. Requires the use of an external AC photocell. See "UM1_Ozone Toolset Software Manual"			
Constant Light function	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. See "UM1_Ozone Toolset Software Manual"			
Digital Input				
DALI / PWM	The same Digital Input (**DALI / PWM**) 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 Tool. See also Ozone Programming Tool section.			
	DALI: 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 consumption: <0.5W. **PWM:** The PWM input accepts a Pulsed Width Modulated signal. This signal allows a 0% to 100% PWM dimming of the Output Current at 150Hz. This input accepts a Signal compliant to the standard IEC/EN 60929. See Application Note 4 "AN4_Ozone DALI e PWM Dimming" for further details.			

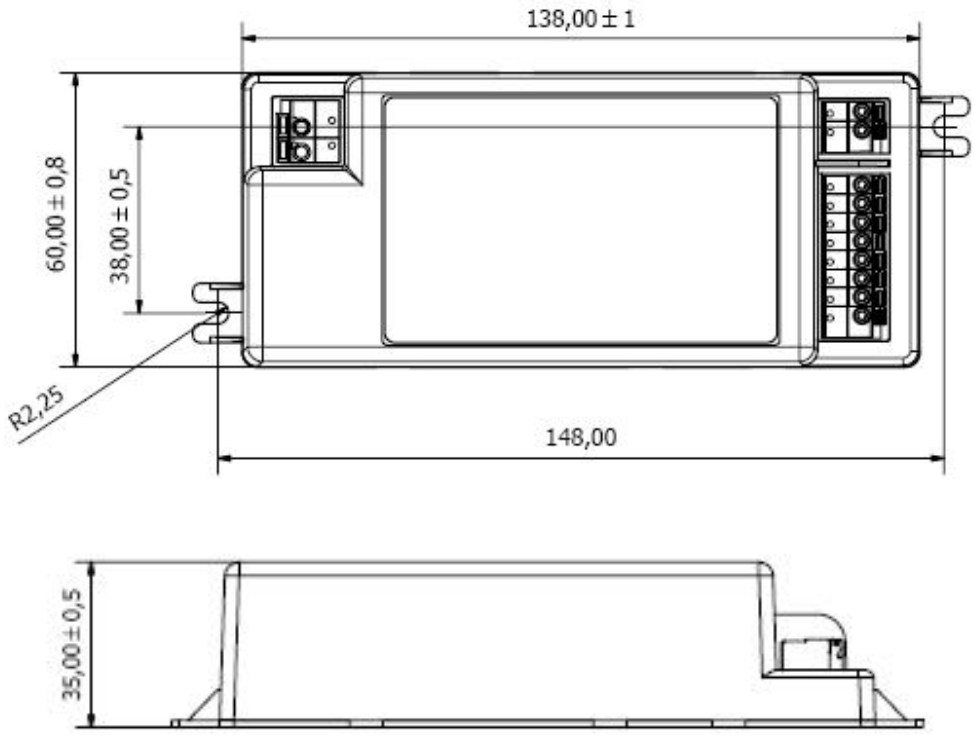
Mechanical Details

Enclosure Material	Plastic
Potting	Yes, half potted
I/O Connections	Push Pin Connector
Mounting Details	2 x Fixing holes for screws
Index of Protection	IP20
Weight	345 g = 0.76lb
Environmental Rating	LED Driver suitable for "Damp Location"

Outline Drawings

Dimensions (Lx W x H) 148mm x 60mm x35mm=5.82"x2.36"x1.37"

All Ozone Models RSOZ070-xxx-xxxx have the same dimensions:



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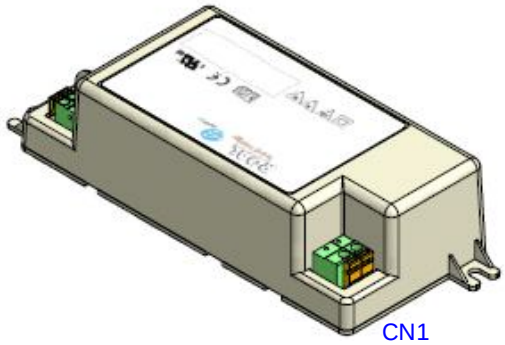
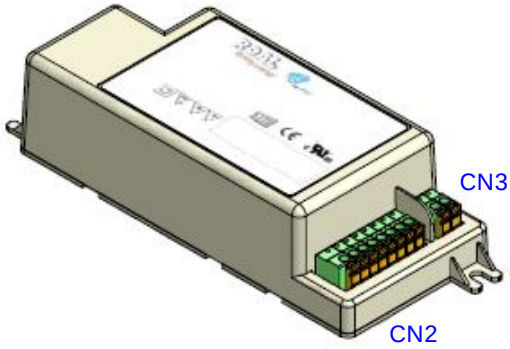
Input/Output/Control Connectors





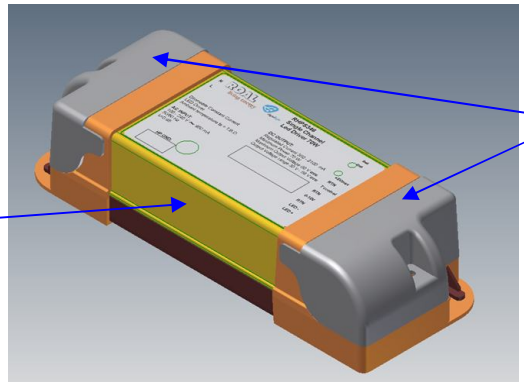
Part	Description	# vie
CN1	AC Main Connector (Line, Neutral)	2
CN2	Output Connector and Controls (LEDs; 0-10V Dimming; Temperature Sense ; Auxiliary Output)	8
CN3	DALI or PWM Connector (DALI/PWM, DALI/PWM)	2

See Application Note 1 "AN1_Ozone Wiring Diagram" for wiring and fixing details.

Ozone Remote Gear Kit (available as optional)

Ozone LED Driver is designed for embedded use. Ozone Remote Gear Kit is an accessory that can 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** (Roal production code: **RHMB346007-00**).
The kit must be ordered separately. It does not come mounted on the LED Driver.

Ozone LED Driver
RSOZ070-xx-Full



Ozone Remote Gear Kit
RSOZ070-RGKIT
(RHMB346007-00)

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Environmental

Max Operating Case Temperature (Tc point)	+85°C without derating
Operating Ambient Temperature	-30°C to 50°C without derating
Operating Relative Humidity	5% to 95%, non condensing
Storage Temperature	-40°C to +85°C
Cooling	Convection cooled
Shock Test	IEC 60068
Vibration Test	IEC 60068
Long Life Time	
MTBF	>150.000hr (50°C, 100% operating time, Telcordia Issue 1 method)

EMC Compliance

Emission Tests

Conducted Emission 9kHz -30MHz	EN55015
Radiated Emission 9kHz -30MHz	EN55015
Radiated Emission 30MHz – 300MHz	EN55015
Harmonic Current Emissions	EN61000-3-2, Class C
Voltage Changes, Fluctuation and flicker	EN61000-3-3
Conducted and Radiated Emission measurement	FCC CFR47-part 15/subpart B

Immunity Tests

Equipment for general lighting purposes - EMC Immunity Requirements	EN61547
ESD (Electrostatic Discharge)	EN61000-4-2
Radiated Radio-Frequency electromagnetic field	EN61000-4-3
Electrical Fast Transient/burst	EN61000-4-4
Surge	EN61000-4-5 Level ±4.0 kV L-N
Conducted disturbances induced by Radio-Frequency fields	EN61000-4-6
Voltage Dips, short interruptions and Voltage Variations	EN61000-4-11
Non repetitive damped oscillatory transient, Ring wave	ANSI C.62.41 Category A1

Safety Agency Approvals

UL Recognized ANSI / UL8750, 1st Ed., CAN/CSA C22.2 N°337, 7th Ed. E330583

Construction as per UL60950-1, 2nd Ed.

LED Driver suitable for "DAMP LOCATION"

IEC/EN61347-2-13 electronic control gear for LED Modules

IEC/EN 62384 DC or AC supplied electronic control gear for LED modules – Performance Requirements

ENEC and CE Mark

Model Table

Model Number (Ordering Code) Note 6		Total Pout max	Output Voltage Range (Under Regulation) Note 3	Absolute Maximum Vout (Under any condition) Note 4	Iout min ; Iout Max Note 5
Package	***Dash #***	***W***	***Vdc***	***Vdc***	***mA***
RSOZ070	-200-Full	70	From 120 to 195	200	From 350 to 550
RSOZ070	-120-Full	70	From 60 to 115	120	From 350 to 1100
RSOZ070	-60-Full	70	From 30 to 56	60	From 350 to 2100
RSOZ070	-35-Full	70	From 20 to 33	35	From 1000 to 2600

Note 3: It represents the Maximum Output Voltage Range of the LED Driver.
The LED Driver Output Voltage Range depends on the current value set (Iset). See also Current Setting section.

Note 4: It represents the Maximum Output Voltage under any condition.

Note 5: The LED Driver Output is a Constant Current Output. The Output current value can be set (Iset) between Iout min and Iout Max (with 50mA step), by using the Ozone Programming Tool (available as optional).
See Ozone Programming Tool section for more details.

Note 6: The Purchase Order must specify the Ordering Code showed in the model table.
For example:

- **RSOZ070-60-Full** for the 60V model.
- **RSOZ070-120-Full** for the 120V model.

Ozone Programming Tool (available as optional)

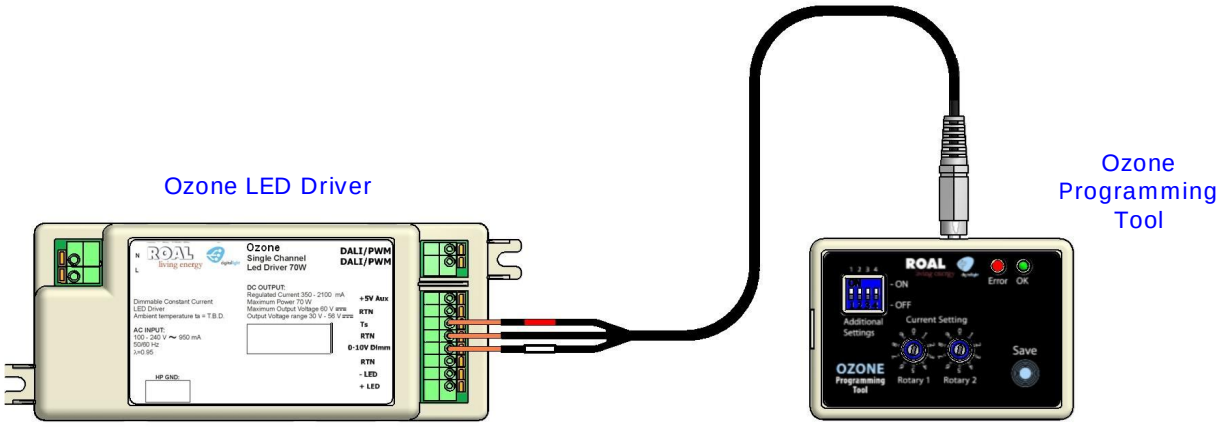
Ozone LED Drivers can be easily set by the customer, for this reason they are extremely flexible and suitable for several applications. For this purpose an external Module (Ozone Programming Tool) is available as optional and can be ordered separately specifying its Ordering Code (See **Note 7**).

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".



Programming Tool Details:

Dimensions (L x W x H)	80mm x 55mm x19mm=3.15"x2.16"x0.75"
Weight	75g = 0.165lb
3-wire Programming Cable	Length 750mm = 29.5"

Current Setting

The Ozone 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 (Iset) and the LED Driver Output Voltage Range, according to the positions of the Rotary Switches.

		RSOZ070-35-Full		RSOZ070-60-Full		RSOZ070-120-Full		RSOZ070-200-Full	
Output Current Set (Iset)	Rotary Position	Vout min Note 10	Vout max Note 10	Vout min Note 10	Vout max Note 10	Vout min Note 10	Vout max Note 10	Vout min Note 10	Vout max Note 10
mA	R1 - R2	Vdc	Vdc	Vdc	Vdc	Vdc	Vdc	Vdc	Vdc
350 Note 9	0-0			30	56	60	115	120	195,0
400	0-1			30	56	60	115	120	175,0
450	0-2			30	56	60	115	120	155,6
500	0-3			30	56	60	115	120	140,0
550	0-4			30	56	60	115	120	127,3
600 Note 9	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 Note 9	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 Note 9	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						

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

Iset=2100mA for RSOZ070-35
Iset=1250mA for RSOZ070-60
Iset=600mA for RSOZ070-120
Iset=350mA for RSOZ070-200.

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2500	4-3	20	28,0
2550	4-4	20	27,5
2600	4-5	20	26,9

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.

Ozone Correlated documents and Software

This document is the Ozone Preliminary Datasheet. The file is called "DS1_Ozone LED Driver 70W Preliminary". During the Ozone adoption please consider that, to support you, there are also Application Notes, User Manual and Software, as shown in the table below.
Please contact Roal Sales Department or your local Distributor if you do not have them.

Application Note Number	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 0-10V or 1-10V 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	UM1_Ozone Toolset Software Manual	Additional LED Driver Settings via SW, Adjustable Dimming Function, Constant Light Function
PC Software	**File Name**	**Topics**
1	Ozone Toolset v1_1	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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