MAIN FEATURES

- Nominal input voltage: 220/277/347/400/440/480 V_{AC}
- Suitable for IEC Class I installations
- Max output power 600 W
- Output current range 300 – 3000 mA programmable (Through DALI-2 or DMX-RDM)
- Output voltage range 172 – 360 V_{DC}
- IEEE 1789 Flicker Recommended Practice Compliant
- No load (Dim-to-Off) power consumption <0.5 W (Compliant with Commission Regulation (EU) 2019/2020, SLR)
- Remote installation capability up to 300 m
- DALI-2 or DMX-RDM control up to 33 fps
- Surge immunity levels: 6 kV (L-N) 10 kV (L/N-PE)
- Certified to CE, UKCA, ENEC, UL and RCM; design compliant with CCC
- Thermal protection for LED Modules
- Lifetime: >50.000 hours at maximum load
- Short circuit, overpower, and over voltage protections
- Adjustable dimming and Constant Lumen Output functions
- DiiA Part 251 and Part 253 specifications implemented
- Remote firmware update
- Emergency Lighting compatible
- IP66, IK08 rated enclosure

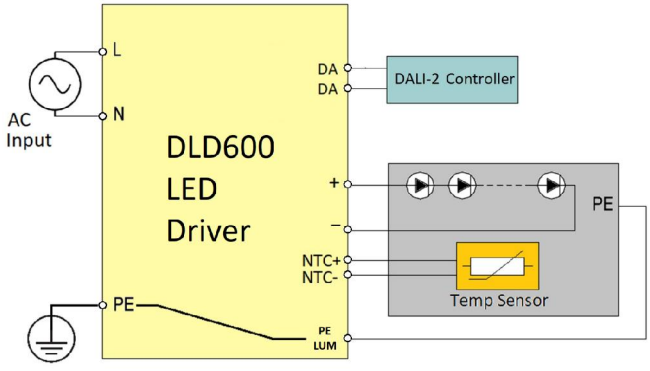
DESCRIPTION

This datasheet details the electrical, mechanical, and environmental specifications of a Class I, input-to-output isolated, 600 W single output constant current, DALI-2 or DMX-RDM programmable LED driver. Its IP66 and IK08 enclosure, including a built-in junction box and high surge immunity, make it suitable for outdoor applications. Its electrical characteristics make it suitable for TV broadcasting applications.

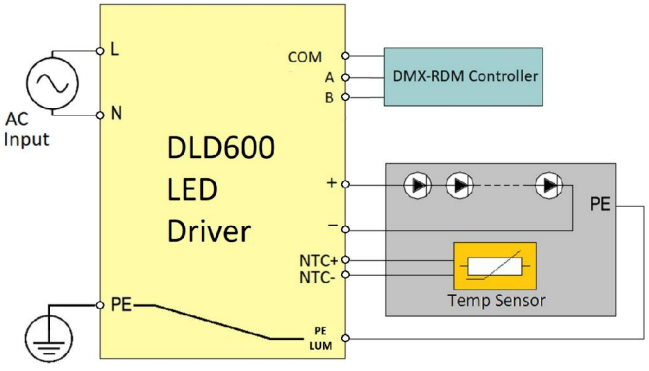
This LED driver has been specifically conceived and intended to supply a high quality and programmable constant current to high end professional LED modules capable of very high luminous flux for sport venues lighting, large area lighting, horticulture, tunnel, and high-mast lighting in general. The technical performances ensure also higher energy efficiency and higher current quality than most common and multi-purpose low / medium power control-gear.

These LED drivers are ENEC certified according to the IEC/EN 61347-2, IEC/EN 61347-1, IEC/EN 62384; UL listed to ANSI / UL8750, and CSA C22.2 No.250; RCM certified to AS 61347-2-13, and AS/NZS 61347-1.

The DLD600LE is compatible to emergency lighting – EL – operating conditions.



DALI-2



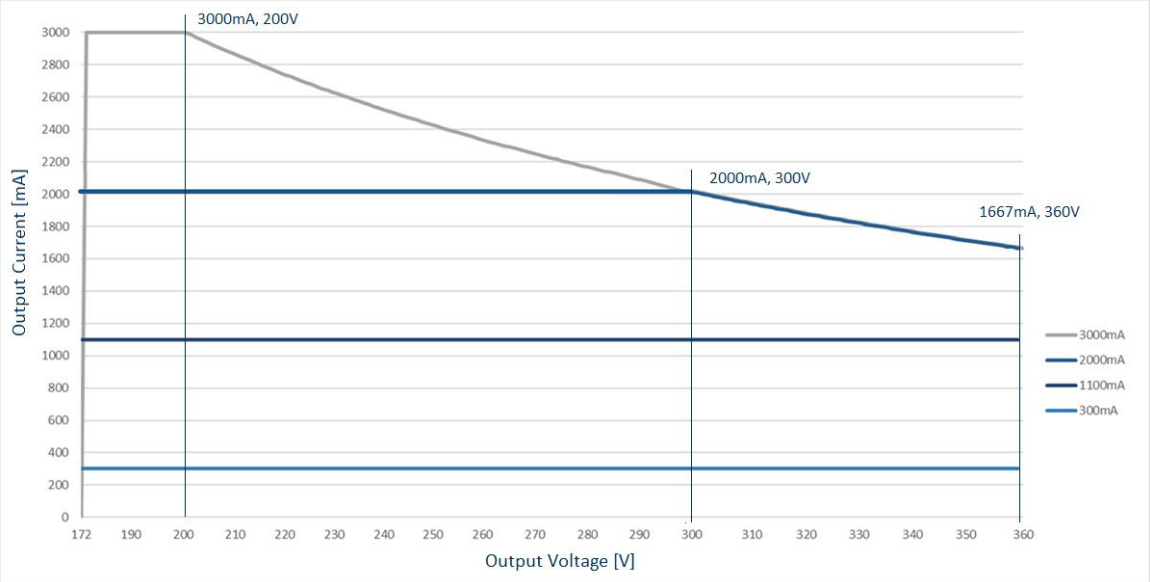
DMX-RDM

MODEL CODING AND OUTPUT RATINGS

Ordering Code	Control	Pout Max [W]	V_{OUT} Operative Range [V_{DC}]	I_{OUT} Programmable Settings [mA]			Full Power V_{OUT} Range [V_{DC}]	Full Power I_{OUT} Adj. Range [A]
				Min	Factory Set	Max		
DLD600LE-H200-DA (RHPS589AL-L-1)	DALI-2	600	172 ÷ 360	300	2000	3000	200 ÷ 360	1.67 ÷ 3.00
DLD600LE-H200-DX (RHPS589BL-L-1)	DMX-RDM	600	172 ÷ 360	300	2000	3000	200 ÷ 360	1.67 ÷ 3.00

NOTE: The above ratings refer to 480 V_{AC} input voltage, 25 °C ambient temperature, and full load operating conditions.

OUTPUT CURRENT-VOLTAGE DIAGRAM (MAX OUTPUT POWER LIMITING)



INPUT SPECIFICATION

Specification	Test Conditions / Notes	Min	Nom	Max	Units
AC Input Voltage	220/240/277/347/400/440/480 V_{AC}	198	220-480	528	V_{AC}
Input Frequency		47	50/60	63	Hz
Efficiency	220 V_{AC}, 1.67 A	92	94	-	%
	220 V_{AC}, 3 A	91.5	93.5	-	
	277 V_{AC}, 1.67 A	92.5	94.5	-	
	277 V_{AC}, 3 A Full load, 25 °C T_{AMB}	92	94	-	
	480 V_{AC}, 1.67 A	93	95	-	
	480 V_{AC}, 3 A	92.5	94.5	-	
Input Current	220 ÷ 480 V_{AC} 100% load	-	-	3.2	A
No-Load Power Consumption	At 230 V_{AC}, 50 Hz, 25 °C T_{AMB} Driver electrically connected to the load, Dim-to-Off (0 A output current)	-	-	0.5	W
Power Factor	220 V_{AC} At 25 °C T_{AMB}	0.98	0.99	0.99	
	277 V_{AC} Min values refer to 50% load	0.94	0.98	0.98	
	400 V_{AC} Nominal Values refer to 80 % load	0.96	0.97	0.97	
	480 V_{AC} Max Values refer to 100% load	0.90	0.95	0.96	
THD	220 V_{AC} At 25 °C T_{AMB}	3.5	4.0	6.5	%
	277 V_{AC} Max values refer to 50% load	4.5	5.5	8	
	400 V_{AC} Nominal Values refer to 80 % load	7	9	12	
	480 V_{AC} Min Values refer to 100% load	10.5	12.5	16	
Inrush Current (peak) Cold start	230 V_{AC}	-	14	15	A
	277 V_{AC} Full Load, 25 °C T_{AMB}	-	18	20	
	400 V_{AC}	-	23	25	
	480 V_{AC}	-	27	30	
Heart Leakage Current	At 480 V_{AC}, 60 Hz, Full Load, 25 °C ambient	-	-	750	µA
Harmonic Current	Complies with EN-61000-3-2, Class C load >25%				

OUTPUT SPECIFICATIONS

Specification	Test Conditions / Notes	Min	Nom	Max	Units
Total Output Power	No derating up to 50 °C ambient temperature	-	-	600	W
Output Voltage		172	-	360	V_{DC}
Output Current	Programmable via DALI or DMX, 2000 mA factory set	300	-	3000	mA
Minimum dimming level		9	10	11	$\%I_{MAX}$
Ripple Current_HF	High frequency (>15 kHz) $I_{HFPk-pk}/Iout_{AVG}$ at 3 A, 200 V 220, 400, 480 V_{AC}	-	4	10	%
Ripple Current_LF	Low frequency <1 kHz 220, 400, 480 V_{AC}	-	1.5	2	%
Flicker	IEEE 1789 Flicker Recommended Practice Compliant				
Current Set Accuracy	V_{IN}: 198÷528 V_{AC}; I_{OUT}: 3.00 A, V_{OUT}: 172÷200 V; 25, 50, -40 °C T_{AMB}	-	±3	±5	$\%I_{OUT}$
Load Regulation	At 400 V_{AC}, -40, 25, 50 °C T_{AMB}, 172÷200 V_{OUT},	-	±1.2	±3	$\%I_{OUT}$
Line Regulation	V_{IN}: 198÷528 V_{AC}, -40, 25, 50 °C T_{AMB}, Max Load	-	±0.05	±1	$\%I_{OUT}$
Temperature Regulation	At 400 V_{AC}, -40, 25, 50 °C T_{AMB}, Max Load	-	±1.5	±5	$\%I_{OUT}$
Turn-on Time	Max output power (200 V, 3.00 A), -40 °C T_{AMB}, any input voltage	-	1.3	2	s
Max Remote distance	The maximum distance between the LED driver and the supplied LED module, connected with an appropriate cable section shall ensure a total voltage drop < 5 V, the total V_F shall not exceed the max V_{OUT} rating, and the total output power (cable + lamps) won't exceed the rated value.				
Start-up Overshoot Current	At 220 ÷ 480 V_{AC}; 172 V_{DC}, 3 A; 200 V_{DC}, 3 A	-	5	10	$\%I_{OUT}$

PROTECTION FEATURES

Specification	Test Conditions / Notes	Min	Nom	Max	Units
Input Under Voltage	V_{IN}: 198 V; 25 °C T_{AMB}; Max Load. No damage. Duty cycle	167		176	V
Output Over Voltage	V_{IN}: 400 V; 25 °C T_{AMB}; Max Load. Shut down and auto recovery	378	-	388	V
Output Under Voltage	Shut down, automatic detection every 60 s	150	-	170	V
Output Short-Circuit	Shut down, automatic detection every 60 s	-	-	-	-
Overpower	Output current will dim to keep maximum output power to the maximum limit. Removing overload, normal operation is recovered.	-	-	600	W
Internal OTP vs T_{AMB}	The LED Driver checks the internal temperature every 60 seconds. If an OT condition is detected, the output current is gradually reduced. In any condition the output current will not decrease below 20% of the set current	-	-	-	°C
No Load V_{OUT}		-	-	420	V
Installation Class	Class I (with PE)				
Isolation	Input-to-Output (Double or reinforced insulation, 4x U + 2000 V) Input-to-DALI/DMX (Double or reinforced insulation, 4x U + 2000 V) Output-to-DALI/DMX (Double or reinforced insulation, 4x U + 2000 V) Input-to-PE/Chassis (Basic insulation, 2x U + 1000 V) Output-to-PE/Chassis (Basic insulation, 2x U + 1000 V)	4372 4500 4200 1830 2100	- - - -	- - - -	V_{AC}

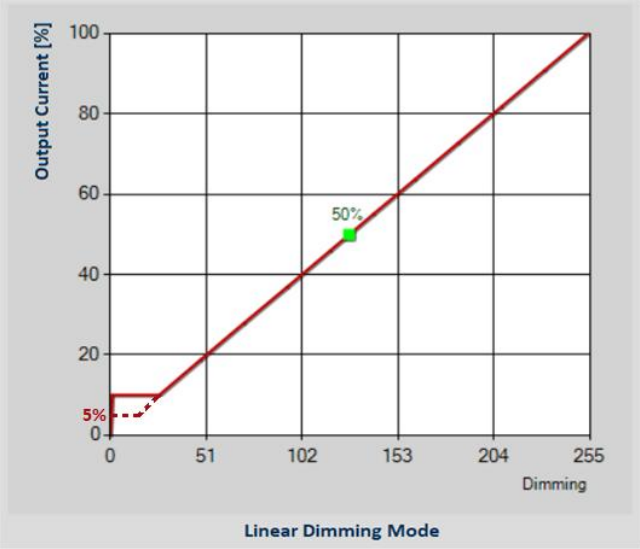
INRUSH CURRENT DATA AND DRIVERS PER MCB CALCULATION

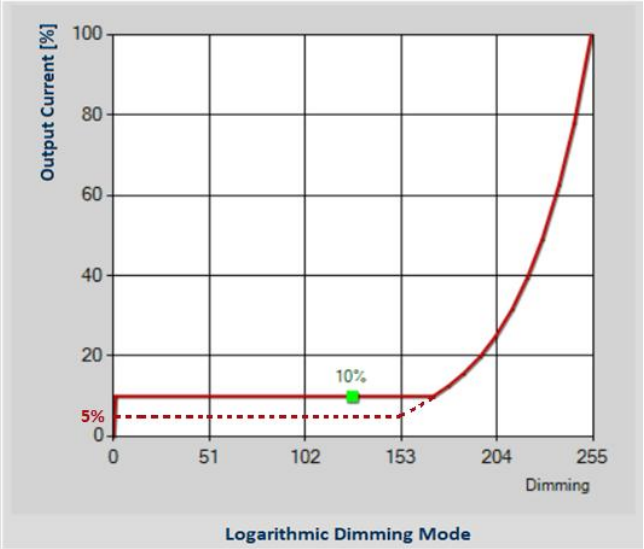
The maximum number of LED drivers connectable to a single MCB is reported in the following table for each nominal input voltage. Due to the different kinds of circuit breakers available on the market, this table is just for reference.

V_{IN}	Inrush Current Data		# Drivers For Each Circuit Breaker														
			Type B					Type C					Type D				
Nominal [V_{AC}]	I peak [A]	Half Value Time [µs]	10A	16A	20A	25A	32A	10A	16A	20A	25A	32A	10A	16A	20A	25A	32A
230	15	1080	2	4	5	6	8	2	4	5	6	8	2	4	5	6	8
400	25	1120	1	3	3	4	6	2	4	5	6	8	2	4	5	6	8
480	30	1200	1	2	3	4	5	3	5	6	8	10	4	7	9	10	10

DALI / DMX OUTPUT CONTROLS

- Dimming range: 10-100% of the max current at 220, 400, 480 V_{AC}, 3 A 200 V_{DC}, -40 / 25 °C ambient temperatures, ±2% accuracy

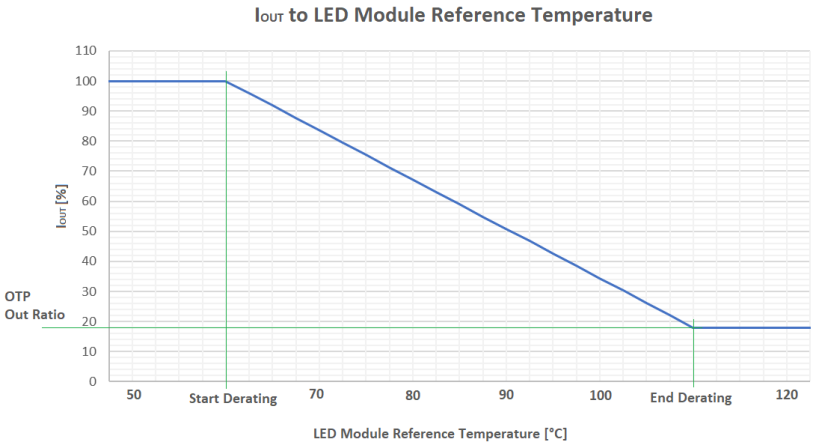


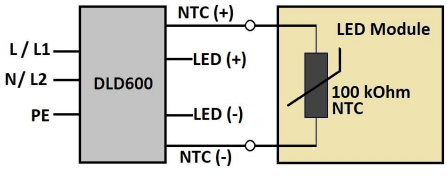


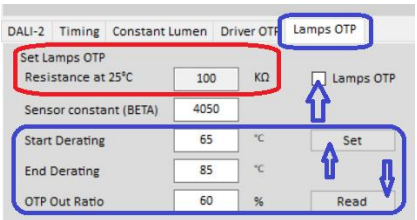
- 5%I_{MAX} minimum dimming level option through factory set up
- Programmable Output Current Timing: 7 segments 0-to-100% each
- Programmable Constant Lumen Output: 14 steps over 60000 hours
- Driver Over Temperature Protection: Start derating and end derating temperatures, minimum 20% I_{SET}. Driver data record
- LED Module Over Temperature Protection: Start derating and end derating temperatures, NTC Constant (BETA). LED module data recording

NTC DIMMING

The DLD600 can read and control the LED module temperature by connecting it to a 100 kΩ NTC thermistor directly assembled onto the LED module deemed as the most representative for thermal reference point.







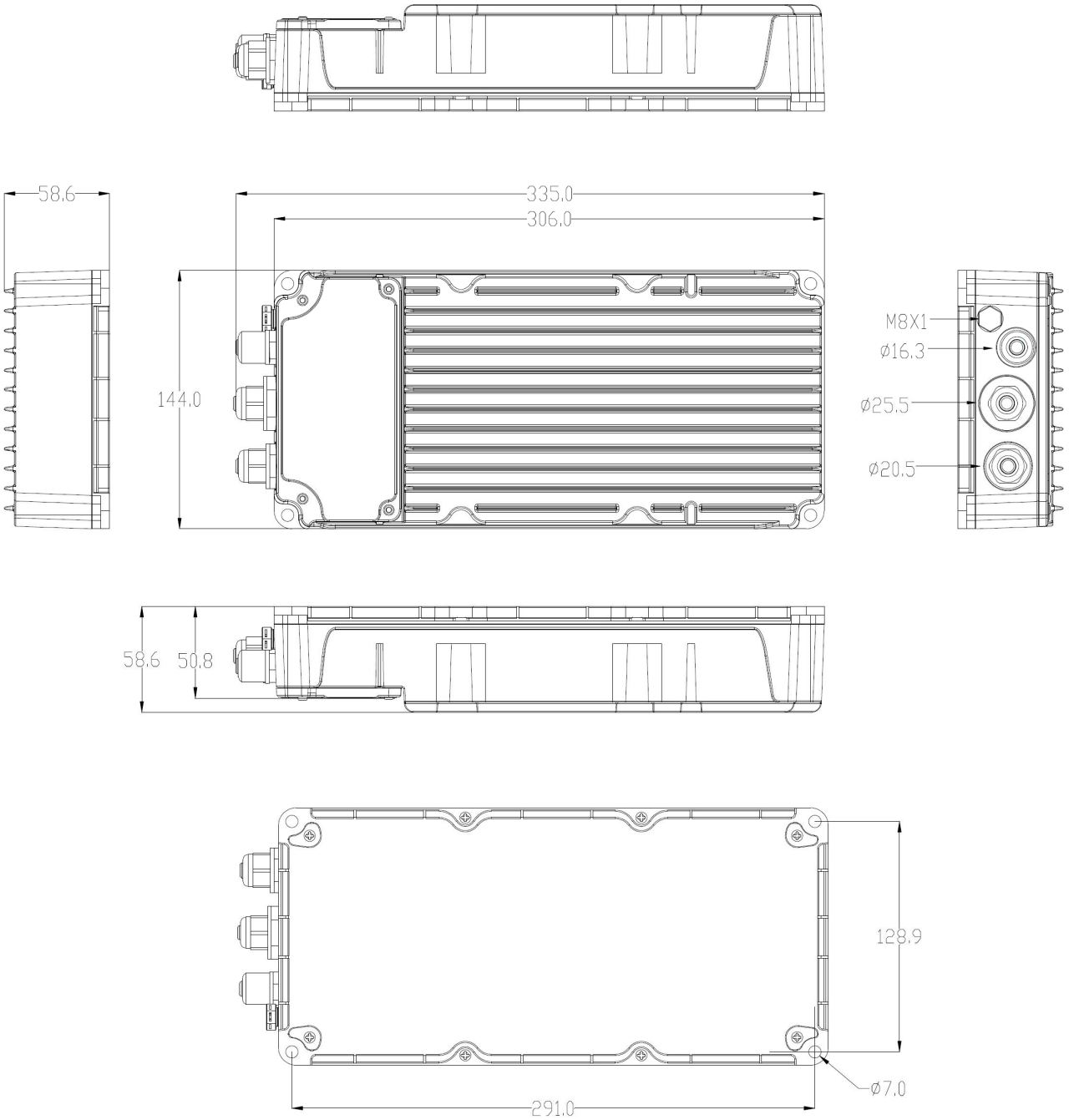
When the temperature exceeds a predetermined "Start Derating" threshold value, the output current provided to the LED module will automatically and gradually decrease to bring the temperature of the LED module back to safe values.
In case that temperature keeps increasing, despite current dimming, up to the "End Derating", the DLD600 will set its output current to the value programmed by customer "OTP Out Ratio".

While "Start Derating", "End Derating" and "OTP Out Ratio" thresholds can be user programmable, the driver has been factory set considering a 100 kΩ, 4050 K standard NTC. See DLD600 Programming User Manual for instructions. The DLD600 can be made compatible with a 10 kΩ NTC through factory special set up.

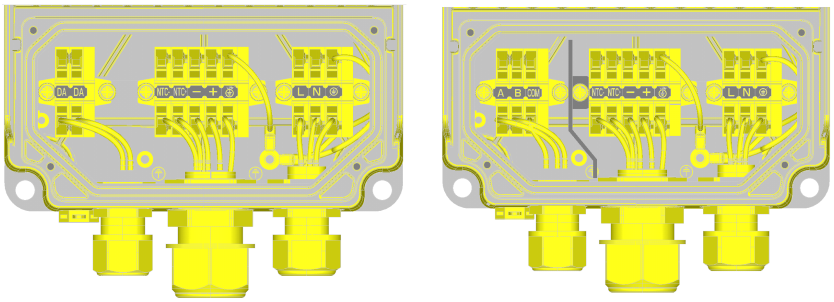
LED module temperature measurement accuracy may depend on the load condition.

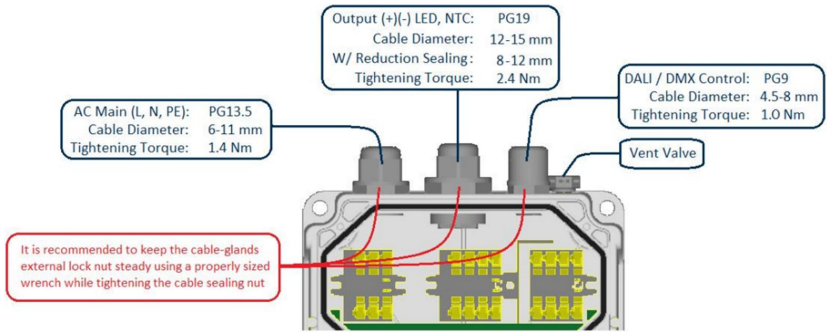
MECHANICAL DETAILS AND OUTLINE DRAWING

Packaging:	ADC12 (A384) die cast aluminium alloy
Finishing:	Powder coating, colour grey anthracite
Enclosure:	IK08
Ingress Protection:	IP66
Environment Corrosion Grade:	C5M (ISO 12944-2) or 1000 hours saline fog w/o corrosion grade (under test)
Overall Dimensions:	144.0 x 335 x 58.6 mm (5.67 x 13.19 x 2.31)
Mass:	3.1 kg ±2%
Note:	PWA potted



OUTLINE DRAWINGS AND INPUT/OUTPUT CONNECTIONS





NOTE: Each DLD600 driver will be provided with a cable-gland reduction gaskets kit

AC INPUT, DC OUTPUT, COMMUNICATION BUS
WAGO 264

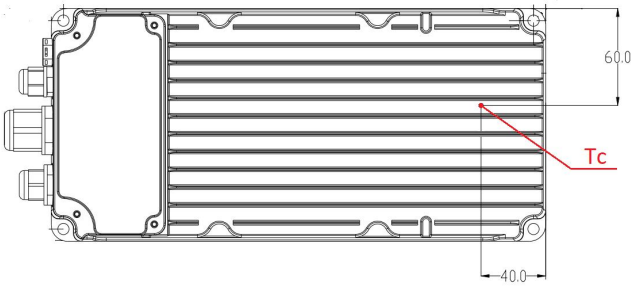
Connection technology	CAGE CLAMP®
Actuation type	Operating tool
Connectable conductor materials	Copper
Solid conductor	0.08 … 2.5 mm² / 28 … 12 AWG
Fine-stranded conductor	0.08 … 2.5 mm² / 28 … 12 AWG
Note (conductor cross-section)	12 AWG: THHN, THWN
Strip length	8 … 9 mm / 0.31 … 0.35 inches
Wiring direction	Front-entry wiring

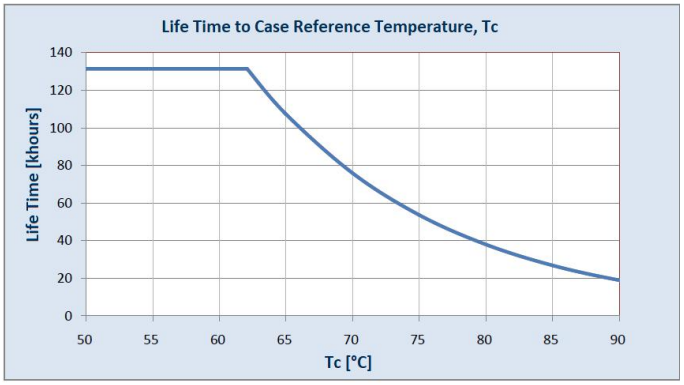
JUNCTION BOX LID FIXING SCREWS:

Type: Stainless steel M3x10 T10
Recommended tightening torque: 8-10 kg.cm

ENVIRONMENTAL SPECIFICATIONS

Specification	Test Conditions / Notes	Min	Nom	Max	Units
Top Case Temperature Range	7 years warranty 70°C case temperature	-40	-	90	°C
Ambient Temperature Range		-40	-	50	°C
Storage Temperature	Relative Humidity 5-85% non-condensing	-40	-	85	°C
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: 5-500 Hz, 1g_{RMS} (0.02 g^2/Hz), 3 axes, 30 min, random Non-Operating: 5-500 Hz, 2.46 g_{RMS} (0.0122 g^2/Hz), 3 axes, 30 min, random				
Vibration EN 60068-2-6	Operating Sine, 10-500 Hz, 1 g, 3 axes, sweep 1 Oct/min., 60 min, 1 g - survival				
MTBF	Telcordia SR-332 Issue 4 (25 °C ambient, max load, duty 50%)	200	-	-	hours
Useful Life	At max load, (70 °C T_C and 45 °C T_{AMB})	-	75.000	-	hours





ELECTROMAGNETIC COMPATIBILITY (EMC) – EMISSIONS

Phenomenon	Conditions / Notes	Standard	Performance Class
Conducted Emission	Test at 220/400/480 V_{AC}	EN55015	
Radiated Emission	Test at 220/400/480 V_{AC}	EN55015	
Conducted Emission	Test at 220/400/480 V_{AC}	EN55032	Class B
Conducted and Radiated Emission	Test at 220/400/480 V_{AC}	FCC CFR47- part 15/subpart B	Class B
Harmonic Current Emissions		EN61000-3-2	Class C (Load>25%)
Voltage Changes, Fluctuation and Flicker		EN61000-3-3	

NOTE: The DLD600LE-H200 drivers comply with the EMC standards and relative limits above as a stand-alone device. Once the drivers are being integrated into a luminaire, EMC should be assessed considering the whole system which includes driver, LED luminaire and any other devices connected to the driver.

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 ±6 kV L-N; ±10 kV L/N-PE	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	2.5 kV	ANSI C.62.41	Category A

SAFETY STANDARDS AND AGENCIES APPROVALS

	EN 61347-2-13:2014+A1 EN 61347-1:2015+A1 EN IEC 62384:2020 EN 62262:2002+A1	MARK
	UL 8750 – Equipment for lighting products, CSA C22.2 No.250.13-22 – LED equipment for lighting applications LED Driver suitable for dry and damp location	MARK
	AS 61347-2-13, AS/NZS 61347-1	MARK
	CE and UKCA declaration of Conformity	MARK
	CB report	REPORT
	IEC 61347-1, IEC / EN 61347-2-13, IEC / EN 61347-2-7, IEC / EN 62384 : 2020	MARK

The DLD600LE-H200 design and construction makes it compliant with FCC, Russian and Chinese safety standards although not certified yet.