

## DH060 Series

### 60W Single Output LED Driver



#### ■ Features

- Constant voltage and current output
- Universal AC input 100~305VAC
- Built-in active PFC function
- High efficiency
- Output protections: Short circuit/Over voltage/Over load
- Fixed derating-cutoff type temperature protection
- Cooling by free air convection
- Digital, analog or DALI control dimming function
- Suitable for inside of the outdoor LED luminaires
- IP65 with Vo/Io adjusting screws, IP67 without Vo/Io adjusting screws
- Class 2 power unit
- Compliance to worldwide safety regulations for lighting
- Suitable for dry/damp/wet locations



IP65/67



#### ■ General functions

Output Power	60W	Input Frequency	50/60Hz
Input Voltage Range	100~305Vac	Operating Temperature	-40°C~+60°C
Storage Temperature	-45°C~+85°C	Safety & EMC	UL8750, UL1310 Class 2, IEC61347, EN55015
Turn-on Delay Time	3.0S max.	Inrush Current	40A at 230Vac, Cold start
Over Temp Protection	Fixed derating-cutoff type temperature protection	Waterproof	IP65/IP67

## ■ Detailed Specification

TABLE 1:

Model		DH060-048S130X-YY	DH060-036S175X-YY	DH060-024S250X-YY	DH060-016S375X-YY	DH060-172S035X-YY
Output	DC Voltage	48Vdc	36Vdc	24Vdc	16Vdc	172Vdc
	Constant Current Operation Voltage <small>note.5</small>	29~48Vdc	22~36Vdc	14~24Vdc	10~16Vdc	104~172Vdc
	Rated DC Current	1300mA	1750mA	2500mA	3750mA	350mA
	Current Range	0~1300mA	0~1750mA	0~2500mA	0~3750mA	0~350mA
	Dimming Current Range	10~100% rated output current (≥50% rated output voltage)				
	Ripple and Noise	300mVp-p	200mVp-p	150mVp-p	150mVp-p	2%Vo
	Voltage ADJ. Range <small>note.3</small>	43~50Vdc	32~38Vdc	22~25Vdc	14~17Vdc	155~181Vdc
	Current ADJ. Range <small>note.3</small>	780~1300mA	1050~1750mA	1500~2500mA	2250~3750mA	210~350mA
	Voltage Tolerance	±1%	±1%	±1%	±1.5%	±1%
	Voltage Line Regulation	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	Voltage Load Regulation	±0.5%	±0.5%	±0.5%	±1%	±0.5%
Input	Efficiency	90.5%	90%	89.5%	89%	92%
	Power Factor	0.97/230Vac	0.97/230Vac	0.97/230Vac	0.97/230Vac	0.97/230Vac
	AC Current	0.8A/100Vac, 0.36A/230Vac				
	Leakage Current	<0.75mA/230Vac; <0.5mA/120Vac				
Output Protection	Over Current	Constant current limiting				
	Short Circuit	Non-dimmer type: recover automatically at hiccup; Dimmer type: Short-circuit power ≤10W.				
	Over Voltage	Shut down at 140% Vo and latch off o/p voltage, re-power on to recover				
Environmental	Operating Humidity	20~95% RH, non-condensing				
	Storage Humidity	10~95% RH				
	Temperature Coefficient	±0.03%/°C (0~50°C)				
	Vibration	10~300Hz, 1G, Period for 60min, each along X、Y、Z axes.				
Safety & EMC	Withstand Voltage	I/P-OP: 3.75KVac; IP-FG: 1.56KVac/2.00KVac (remove discharge tube); O/P-FG: 2.00KVac				
	Isolation Resistance	IP-OP, IP-FG, O/P-FG: 100M Ohms/500Vdc/25°C/70% RH				
	EMC Interference	Compliance to EN55015, EN55022 (CISPR22) Class B				
	EMC Emission	Compliance to EN61000-3-2 Class C (≥50%load); EN61000-3-3				
	EMC Immunity	Compliance to EN61000-4-2, 3, 4, 5, 6, 8, 11; ENV50204, EN61547, EN55024				
Others	Authentication	UL class 2/CE/RoHS/REACH				CE/RoHS/REACH
	MTBF	374k Hrs at full load and 30°C ambient conditions per MIL-HDBK-217F				
	Input Over-voltage	Can survive input over-voltage stress of 320Vac for 48 hours				
	Dimensions (mm)	190×68×41.3				
	Max. Case Temp.	Tc max=80°C				
	Net Weight	0.94Kg/pcs				
Note	1. All parameters NOT specially mentioned are measured at 230Vac input, rated load and 25°C of ambient temperature.					
	2. Ripple & noise are measured: at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1μf & 47μf parallel capacitor.					
	3. Output voltage and current can be adjusted by internal potentiometer ("A" type only).					
	4. Tolerance: includes set up tolerance, voltage line regulation and voltage load regulation.					
	5. Constant current operation region is within 60% ~100% rated output voltage. This is the suitable operation region for LED related applications, but please reconfirm special electrical requirements for some specific system design.					
	6. Derating may be needed under low input voltages. Please check the Static Characteristics for more details.					
	7. Safety and EMC design refer to EN60598-1, subject 8750 (UL), CNS15233, GB7000.1, FCC part18.					
	8. Length of set up time is measured at cold first start. Turning ON/OFF the power supply may lead to increase of the set up time.					
	9. The power supply is considered as a component that will be operated in combination with final equipment. Since EMC performance will be affected by the complete installation, the final equipment manufacturers must re-qualify EMC Directive on the complete installation again.					
	10. Canada (output voltage: 42-60V) : suitable for class 2 wiring method.					

TABLE 2:

Model		DH060-086S070X-YY	DH060-057S105X-YY	DH060-042S140X-YY	DH060-030S210X-YY	DH060-020S300X-YY
Output	DC Voltage	86Vdc	57Vdc	42Vdc	30Vdc	20Vdc
	Constant Current Operation Voltage <small>note.5</small>	52~86Vdc	34~57Vdc	26~42Vdc	18~30Vdc	12~20Vdc
	Rated DC Current	700mA	1050mA	1400mA	2100mA	3000mA
	Current Range	0~700mA	0~1050mA	0~1400mA	0~2100mA	0~3000mA
	Dimming Current Range	10~100% rated output current (≥50% rated output voltage)				
	Ripple and Noise	2%Vo	2%Vo	200mVp-p	200mVp-p	150mVp-p
	Voltage ADJ. Range <small>note.3</small>	77~90Vdc	51~60Vdc	38~44Vdc	27~32Vdc	18~21Vdc
	Current ADJ. Range <small>note.3</small>	420~700mA	630~1050mA	840~1400mA	1260~2100mA	1800~3000mA
	Voltage Tolerance	±1%	±1%	±1%	±1%	±1%
	Voltage Line Regulation	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	Voltage Load Regulation	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
Input	Efficiency	91%	91%	90%	90%	89%
	Power Factor	0.97/230Vac	0.97/230Vac	0.97/230Vac	0.97/230Vac	0.97/230Vac
	AC Current	0.8A/100Vac, 0.36A/230Vac				
	Leakage Current	<0.75mA/230Vac; <0.5mA/120Vac				
Output Protection	Over Current	Constant current limiting				
	Short Circuit	Non-dimmer type: recover automatically at hiccup; Dimmer type: Short-circuit power ≤10W.				
	Over Voltage	Shut down at 140% Vo and latch off o/p voltage, re- power on to recover				
Environmental	Operating Humidity	20~95% RH, non-condensing				
	Storage Humidity	10~95% RH				
	Temperature Coefficient	±0.03%/°C (0~50°C)				
	Vibration	10~300Hz, 1G, Period for 60min, each along X、 Y、 Z axes.				
Safety & EMC	Withstand Voltage	I/P-OP: 3.75KVac; IP-FG: 1.56KVac/2.00KVac (remove discharge tube); O/P-FG: 2.00KVac				
	Isolation Resistance	IP-OP, IP-FG, O/P-FG: 100M Ohms/500Vdc/25°C/70% RH				
	EMC Interference	Compliance to EN55015, EN55022 (CISPR22) Class B				
	EMC Emission	Compliance to EN61000-3-2 Class C (≥50%load); EN61000-3-3				
	EMC Immunity	Compliance to EN61000-4-2, 3, 4, 5, 6, 8, 11; ENV50204, EN61547, EN55024				
Others	Authentication	CE/RoHS/REACH				
	MTBF	374k Hrs at full load and 30°C ambient conditions per MIL-HDBK-217F				
	Input Over-voltage	Can survive input over-voltage stress of 320Vac for 48 hours				
	Dimensions (mm)	190×68×41.3				
	Max. Case Temp.	Tc max=80°C				
	Net Weight	0.94Kg/pcs				
Note	1. All parameters NOT specially mentioned are measured at 230Vac input, rated load and 25°C of ambient temperature.					
	2. Ripple & noise are measured: at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1μf & 47μf parallel capacitor.					
	3. Output voltage and current can be adjusted by internal potentiometer (“A” type only).					
	4. Tolerance: includes set up tolerance, voltage line regulation and voltage load regulation.					
	5. Constant current operation region is within 60% ~100% rated output voltage. This is the suitable operation region for LED related applications, but please reconfirm special electrical requirements for some specific system design.					
	6. Derating may be needed under low input voltages. Please check the Static Characteristics for more details.					
	7. Safety and EMC design refer to EN60598-1, subject 8750 (UL), CNS15233, GB7000.1, FCC part18.					
	8. Length of set up time is measured at cold first start. Turning ON/OFF the power supply may lead to increase of the set up time.					
	9. The power supply is considered as a component that will be operated in combination with final equipment. Since EMC performance will be affected by the complete installation, the final equipment manufacturers must re-qualify EMC Directive on the complete installation again.					
	10. Canada (output voltage: 42-60V) : suitable for class 2 wiring method.					

TABLE 3:

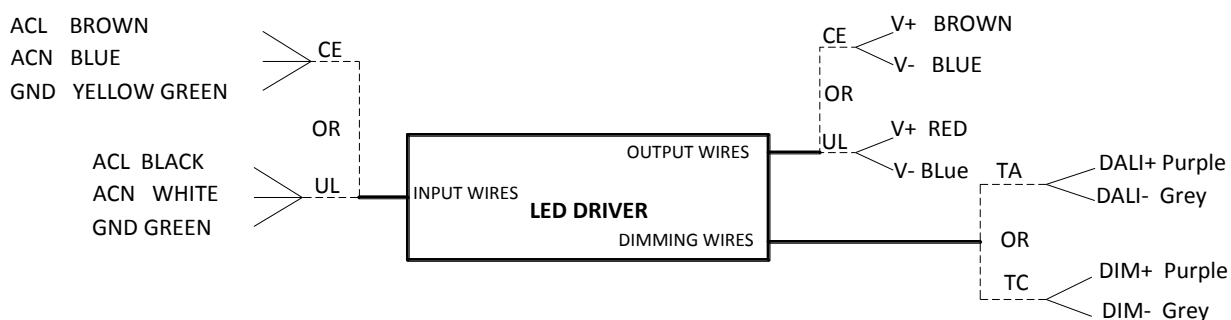
Model		DH060-012S500X-YY				
Output	DC Voltage	12Vdc				
	Constant Current Operation Voltage <small>note.5</small>	7.2~12Vdc				
	Rated DC Current	5000mA				
	Current Range	0~5000mA				
	Dimming Current Range	10~100% rated output current (≥50% rated output voltage)				
	Ripple and Noise	150mVp-p				
	Voltage ADJ. Range <small>note.3</small>	11~13Vdc				
	Current ADJ. Range <small>note.3</small>	3000~5000mA				
	Voltage Tolerance	±2%				
	Voltage Line Regulation	±0.5%				
	Voltage Load Regulation	±1.5%				
Input	Efficiency	87.5%				
	Power Factor	0.97/230Vac				
	AC Current	0.8A/100Vac, 0.36A/230Vac				
	Leakage Current	<0.75mA/230Vac; <0.5mA/120Vac				
Output Protection	Over Current	Constant current limiting				
	Short Circuit	Non-dimmer type: recover automatically at hiccup; Dimmer type: Short-circuit power ≤10W.				
	Over Voltage	Shut down at 140% Vo and latch off o/p voltage, re- power on to recover				
Environmental	Operating Humidity	20~95% RH, non-condensing				
	Storage Humidity	10~95% RH				
	Temperature Coefficient	±0.03%/°C (0~50°C)				
	Vibration	10~300Hz, 1G, Period for 60min, each along X、 Y、 Z axes.				
Safety & EMC	Withstand Voltage	I/P-OP: 3.75KVac; IP-FG: 1.56KVac/2.00KVac (remove discharge tube); O/P-FG: 2.00KVac				
	Isolation Resistance	IP-OP, IP-FG, O/P-FG: 100M Ohms/500Vdc/25°C/70% RH				
	EMC Interference	Compliance to EN55015, EN55022 (CISPR22) Class B				
	EMC Emission	Compliance to EN61000-3-2 Class C (≥50%load); EN61000-3-3				
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## ■ Part number code

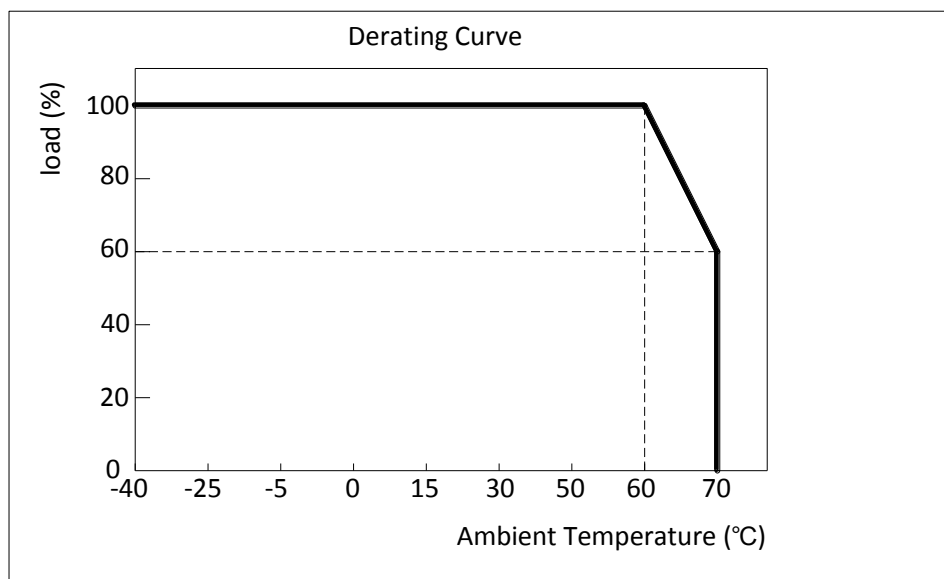
D	H	060	-	024	S	250	A	-	TA
Lighting products									Optional mode: two letters Default: no additional features TA: DALI dimming function, isolated output TC: 3 in 1 dimming function (PWM, resistance, voltage) TE: Customized timeshare dimming TF: Programmable timeshare dimming
E: Economic LED driver R: High performance LED driver H: High efficiency LED driver									Optional mode: one letter Default: no additional features A: output voltage and current can be adjusted
Output power(W): three numbers Filled 0 in front of it when less than 3.									Output current(×10mA): three numbers Filled 0 in front of it when less than 3; four numbers are available if needed. For example: 250 means 2500mA, 035 means 350mA
Output voltage(V): three numbers Filled 0 in front of it when less than 3. For example: 143 means 143V, 024 means 24V									Output channel: one letter S: Single channel output      D: Double channel output T: Triple channel output      Q: Quadruple channel output F: Quintuple channel output   H: sextuple channel output

For example: DH060-024S250A-TA means: high efficiency LED driver; output power 60W; output voltage 24Vdc; output current 2500mA; single output; output voltage and current can be adjusted; with DALI dimming function and isolated output.

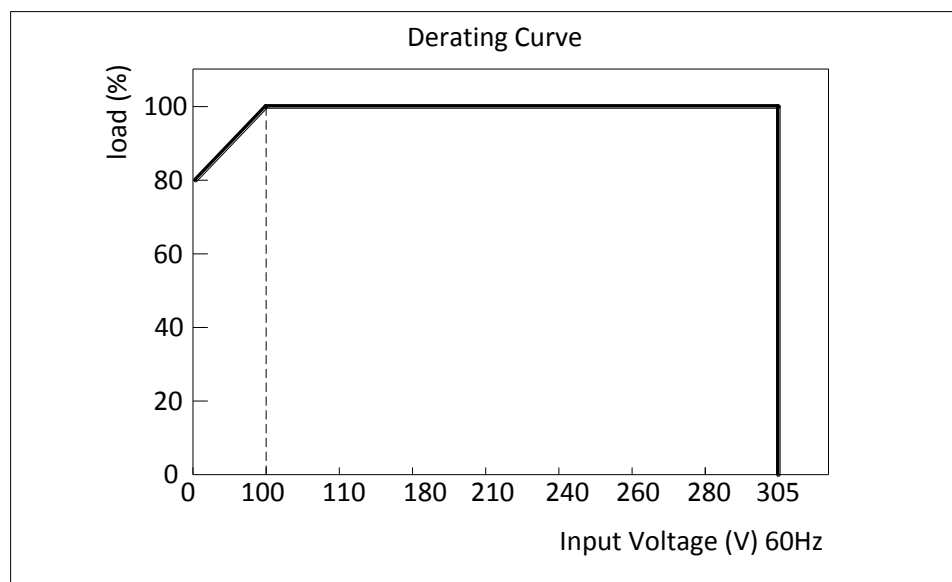
## ■ wiring diagram



## ■ Derating Curve

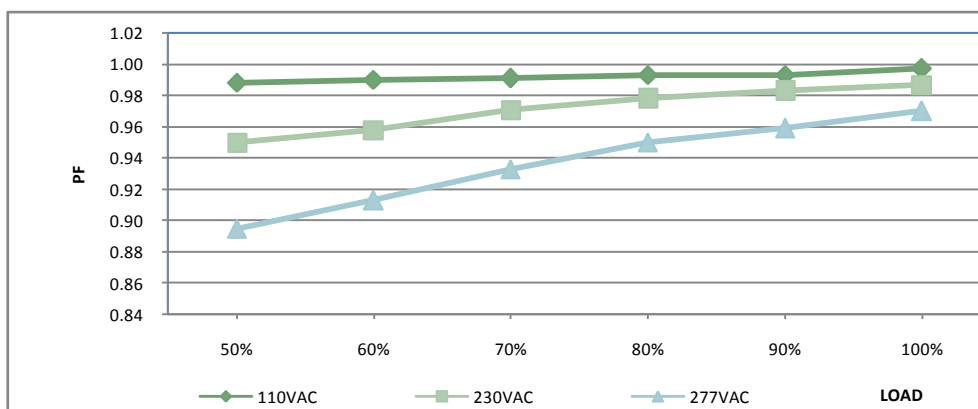


## ■ Static Characteristics

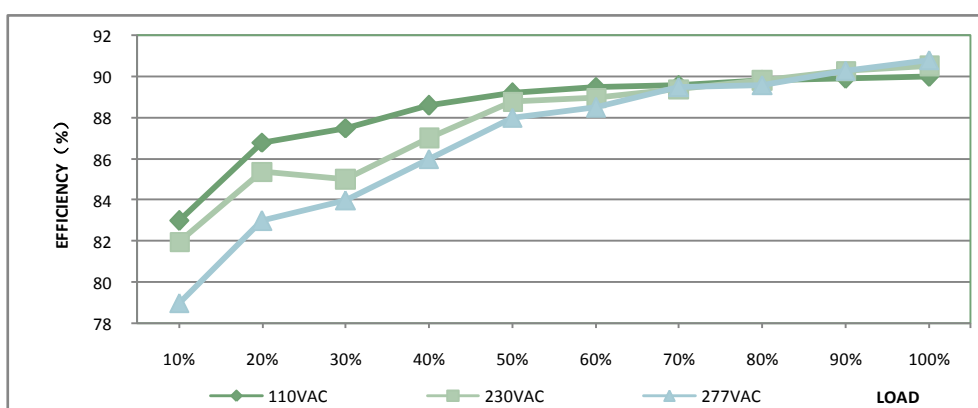




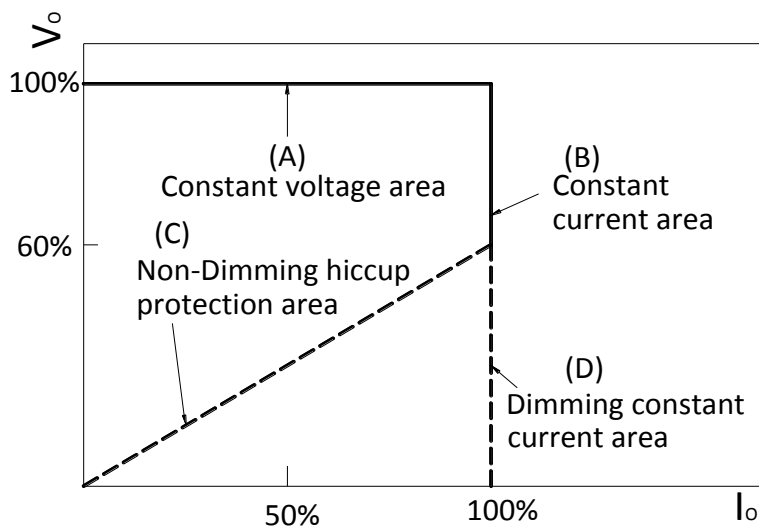
## ■ Power Factor Characteristic (DH060-032S200)



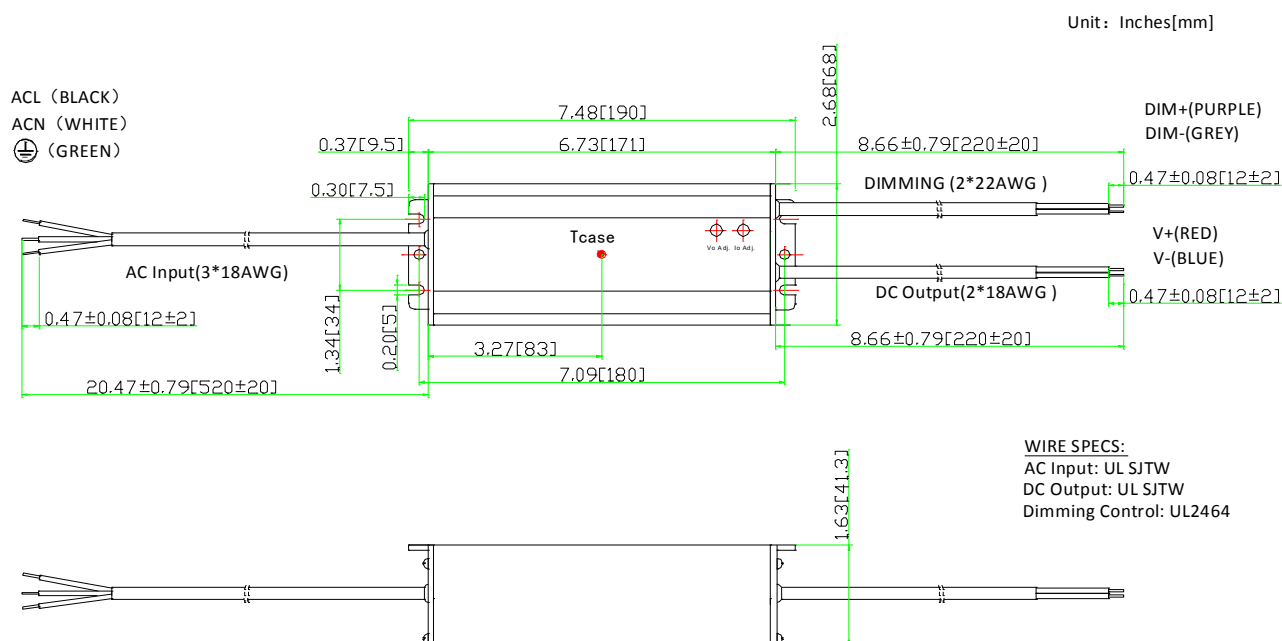
## ■ EFFICIENCY vs LOAD (DH060-032S200)



## ■ Typical LED power supply I-V curve



## ■ Mechanical Outline



- ※Tcase: Max. Case Temperature
- ※Power's internal temperature is 10 °C warmer than case temperature.
- ※No dimming control wire if without dimming function.

## ■ “A” option

- a. Output voltage and current can be adjusted by internal potentiometer.
- b. IP65.
- c. These products shall be enclosed in the end product, when the unit provided with voltage and current adjustable holes.

## ■ “-TA” option: DALI dimming

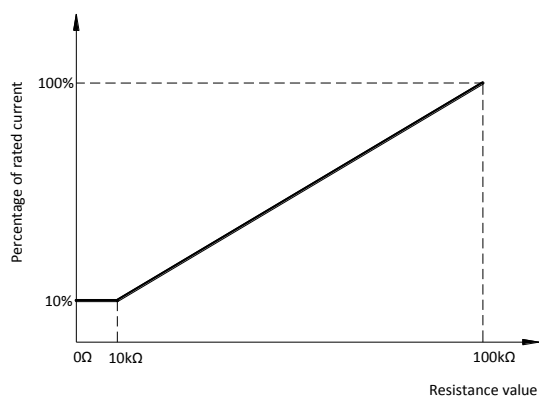
- a. DALI Testing Software: Please refer to [www.impowercorp.com](http://www.impowercorp.com) for downloading.
- b. Percentage of rated current: 10%~100%.
- c. “TA” version LED driver shall work with a DALI Master and DALI Master control software.



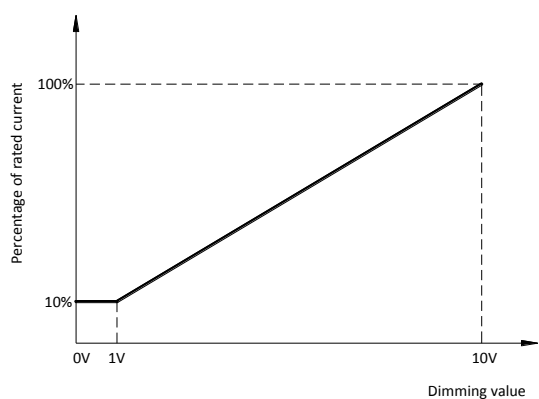


## ■ “-TC” option: 0-10V, resistance & PWM dimming

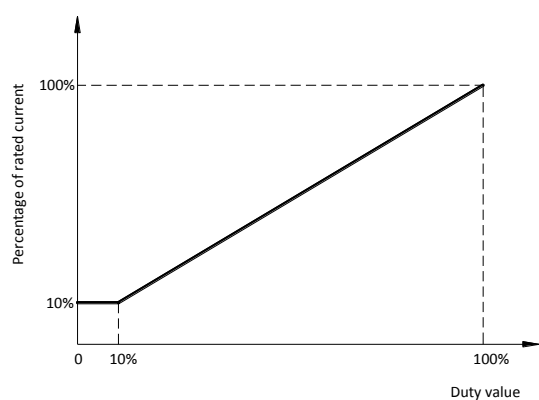
a. Reference resistance value for output current adjustment (Typical)



b. 0-10V dimming function for output current adjustment (Typical)



c. 10V PWM signal for output current adjustment (Typical): Frequency range: 200Hz~1.5KHz



Dimming control details:

Parameters		Minimum	Typical	Maximum
Dimming Type	Resistance	0k $\Omega$	0-100k $\Omega$	$\infty$
	Voltage	-2V	0-10V	15V
	PWM(10%~100% f=200Hz~1.5KHz)	-2V	0-10V	15V
Dimming Current		-0.5mA	-	0.5mA

## ■ "-TE" option: Customized timeshare dimming.

- Different output current (10% - 100% rate output current) can be set for different time periods.
- Maximum 4 sections is available. The minimum length is 0 to maximum 12 hours for each section.
- The parameter can't be changed after shipping.

## ■ "-TF" option: Programmable timeshare dimming.

- Output current is programmable with the range of 10%~100% of rated output current.
- Maximum 4 sections timeshare dimming is available. The minimum length is 0 to maximum 12 hours for each section.

For example:

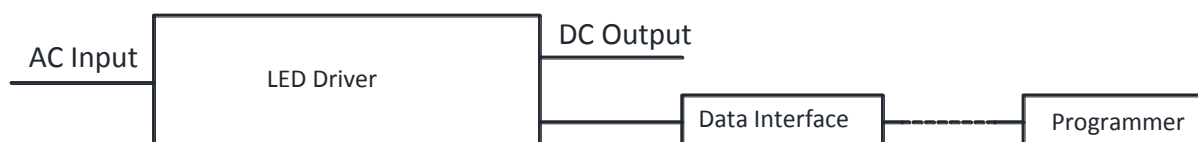
The first section: the time period is 0~1h, the output current is 40% of rated output current.

The second section: the time period is 1h~4h, the output current is 100% of rated output current.

The third section: the time period is 4h~8h, the output current is 40% of rated output current.

The fourth section: the time period is 8h~12h, output current is 60% of rated output current.

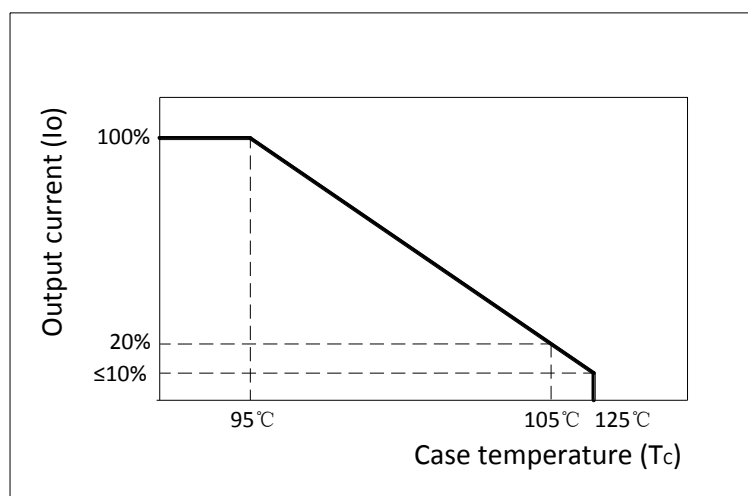
- The parameters are set by a programmer.
- The data interface is waterproof.



## ■ Input and output Dielectric strength

Isolation	Input Wires	Output Wires	Isolated Dimming Control Wires	Chassis
Input Wires	NA	3750	2000	1560/2000(remove discharge tube)
Output Wires	3750	NA	2000	2000
Isolated Dimming Control Wires	2000	2000	NA	2000
Chassis	1560/2000(remove discharge tube)	2000	2000	NA

## ■ Fixed derating-cutoff type temperature protection



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