

## Features

- High Efficiency (Up to 91%)
- Constant Current Output
- 0-10V Dimming Control
- Input surge protection: 4kV line-line, 6kV line-earth
- All-Around Protection: OVP, SCP, OTP
- Waterproof (IP67) and UL Dry / Damp / Wet Location
- SELV Output
- TYPE HL, for use in a Class I, Division 2 hazardous (Classified) location



## Description

The ESC-150SxxxDT(ST) series is a 150W, constant-current LED driver that operates from 249 ~ 528 Vac input with excellent power factor. It is created for high bay, tunnel and roadway lights. The high efficiency of these drivers and compact metal case enables them to run cooler, significantly improving reliability and extending product life. To ensure trouble-free operation, protection is provided against input surge, output over voltage, short circuit, and over temperature.

## Models

Output Current (1)	Input Voltage Range(2)	Output Voltage Range	Max. Output Power	Typical Efficiency (3)	Power Factor		Model Name
					277Vac	480Vac	
580 mA	249 ~ 528 Vac	129~257Vdc	150 W	91%	0.95	0.90	ESC-150S058DT(ST)
700 mA	249 ~ 528 Vac	107~214Vdc	150 W	91%	0.95	0.90	ESC-150S070DT(ST)
1050 mA	249 ~ 528 Vac	71~142Vdc	150 W	90%	0.95	0.90	ESC-150S105DT(ST)
1400 mA	249 ~ 528 Vac	53~107Vdc	150 W	90%	0.95	0.90	ESC-150S140DT(ST) <sup>(4)</sup>
2100 mA	249 ~ 528 Vac	36~71 Vdc	150 W	90%	0.95	0.90	ESC-150S210DT(ST) <sup>(4)</sup>
2800 mA	249 ~ 528 Vac	27~54 Vdc	150 W	90%	0.95	0.90	ESC-150S280DT(ST) <sup>(4)</sup>
3500 mA	249 ~ 528 Vac	21~43 Vdc	150 W	89%	0.95	0.90	ESC-150S350DT(ST) <sup>(4)</sup>
4200 mA	249 ~ 528 Vac	18~36 Vdc	150 W	89%	0.95	0.90	ESC-150S420DT(ST) <sup>(4)</sup>

**Notes:** (1) The output current is adjustable at factory from 50% to 100%.

(2) Certified input voltage range: 277-480Vac

(3) Measured at full load and 277 Vac input.

(4) SELV output

## Input Specifications

Parameter	Min.	Typ.	Max.	Notes
Input Voltage	249 Vac	-	528 Vac	
Input Frequency	47 Hz	-	63 Hz	
Leakage Current	-	-	1 mA	At 480Vac/60Hz input; grounding effectively

## Input Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes
Input AC Current	-	-	0.7 A	Measured at full load and 277 Vac input.
	-	-	0.42 A	Measured at full load and 480 Vac input.
Inrush Current( $I^2t$ )	-	-	1.5 A <sup>2</sup> s	At 480Vac input, 25°C cold start, duration=400 $\mu$ s, 10%Ipk-10%Ipk.
PF	0.90	-	-	At 277-480Vac, 50-60Hz, 75%-100% Load (112.5-150W)
THD	-	-	20%	At 347-480Vac, 50-60Hz, 75%-100% Load (112.5-150W)
	-	-	30%	At 277Vac, 50-60Hz, 75%-100% Load (112.5-150W)

## Output Specifications

Parameter	Min.	Typ.	Max.	Notes
Output Current Range	-5%		5%	
Total Output Current Ripple (pk-pk)	-	5%Io	10%Io	At full load condition, 20 MHz BW
Output Current Ripple at < 200 Hz (pk-pk)	-	2%Io	-	At full load condition. Only this component of ripple is associated with visible flicker.
Startup Overshoot Current	-	-	10%Io	At full load condition.
No load Output Voltage				
Io = 580 mA	-	-	270 V	
Io = 700 mA	-	-	225 V	
Io = 1050 mA	-	-	155 V	
Io = 1400 mA	-	-	120 V	
Io = 2100 mA	-	-	85 V	
Io = 2800 mA	-	-	65 V	
Io = 3500 mA	-	-	50 V	
Io = 4200 mA	-	-	42 V	
Line Regulation	-	-	± 1%	
Load Regulation	-	-	± 3%	
Turn-on Delay Time	-	-	1.0 s	Measured at 277Vac and 480Vac input, 75%-100% Load
Temperature coefficient	-	0.03%/°C	-	Case temperature = 0°C ~Tc max

**Note:** All specifications are typical at 25 °C unless otherwise stated.

## Protection Functions

Parameter	Notes
Over Temperature Protection	Decreases output current, returning to normal after over temperature is removed.
Short Circuit Protection	No damage will occur when any output is short circuited. The output shall return to normal when the fault condition is removed.
Over Voltage Protection	Limits output voltage at no load and in case the normal voltage limit fails.

## General Specifications

Parameter	Min.	Typ.	Max.	Notes
Efficiency at 277 Vac input:				
I <sub>o</sub> = 580 mA	90%	91%	-	Measured at full load and steady-state temperature in 25°C ambient; (Efficiency will be about 1.0% lower if measured immediately after startup.)
I <sub>o</sub> = 700 mA	90%	91%	-	
I <sub>o</sub> = 1050 mA	89%	90%	-	
I <sub>o</sub> = 1400 mA	89%	90%	-	
I <sub>o</sub> = 2100 mA	89%	90%	-	
I <sub>o</sub> = 2800 mA	89%	90%	-	
I <sub>o</sub> = 3500 mA	88%	89%	-	
I <sub>o</sub> = 4200 mA	88%	89%	-	
Efficiency at 480 Vac input:				
I <sub>o</sub> = 580 mA	89%	90%	-	Measured at full load and steady-state temperature in 25°C ambient; (Efficiency will be about 1.0% lower if measured immediately after startup.)
I <sub>o</sub> = 700 mA	89%	90%	-	
I <sub>o</sub> = 1050 mA	88%	89%	-	
I <sub>o</sub> = 1400 mA	88%	89%	-	
I <sub>o</sub> = 2100 mA	88%	89%	-	
I <sub>o</sub> = 2800 mA	88%	89%	-	
I <sub>o</sub> = 3500 mA	87%	88%	-	
I <sub>o</sub> = 4200 mA	87%	88%	-	
MTBF	-	259,800 hours	-	Measured at 480Vac input, 80%Load and 25°C ambient temperature (MIL-HDBK-217F)
Lifetime	-	140,000 hours	-	Measured at 480Vac input, 80% load; Case temperature=60°C @ T <sub>c</sub> point. See life time vs. T <sub>c</sub> curve for the details
Operating Case Temperature for Safety T <sub>c_s</sub>	-40°C	-	+85°C	
Operating Case Temperature for Warranty T <sub>c_w</sub>	-40°C	-	+75°C	
Storage Temperature	-40 °C	-	+85 °C	Humidity: 5% RH to 100% RH
Dimensions				With mounting ear
Inches (L × W × H)	7.40 × 3.70 × 1.71			8.74× 3.70 × 1.71
Millimeters (L × W × H)	188 × 93.9 × 43.5			222× 93.9 × 43.5
Net Weight	-	1300 g	-	

**Note:** All specifications are typical at 25 °C unless otherwise stated.

## Safety & EMC Compliance

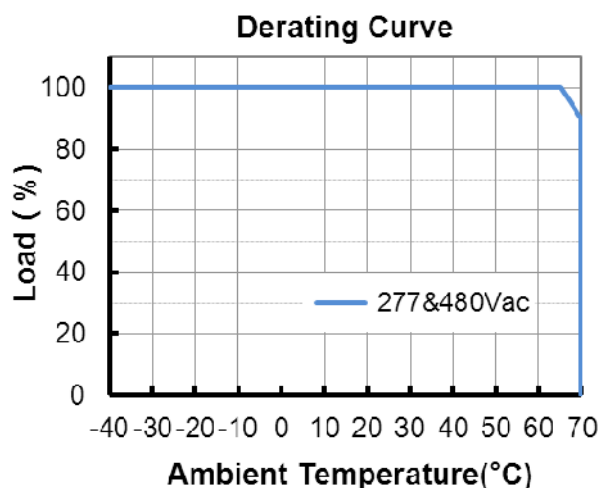
Safety Category	Standard
UL/CUL	UL 8750, CAN/CSA-C22.2 No. 250.13
CE	EN 61347-1, EN61347-2-13
EMI Standards	Notes
EN 55015 <sup>(1)</sup>	Conducted emission Test & Radiated emission Test
EN 61000-3-2	Harmonic current emissions
EN 61000-3-3	Voltage fluctuations & flicker
FCC Part 15 <sup>(1)</sup>	ANSI C63.4 Class B
	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: [1] this device may not cause harmful interference, and [2] this device must accept any interference received, including interference that may cause undesired Operation.

## Safety & EMC Compliance (Continued)

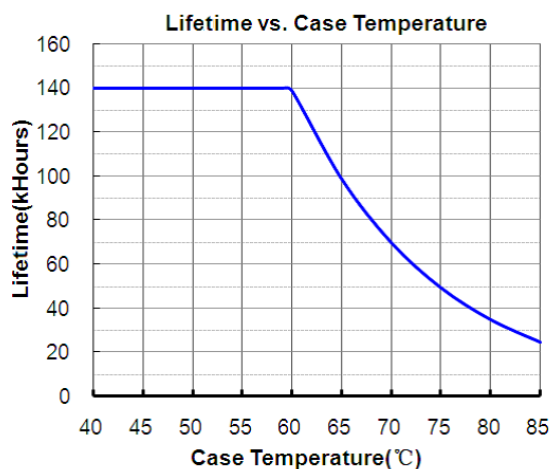
EMS Standards	Notes
EN 61000-4-2	Electrostatic Discharge (ESD): 8 kV air discharge, 4 kV contact discharge
EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test-RS
EN 61000-4-4	Electrical Fast Transient / Burst-EFT
EN 61000-4-5	Surge Immunity Test: AC Power Line: line to line 4 kV, line to earth 6 kV
EN 61000-4-6	Conducted Radio Frequency Disturbances Test-CS
EN 61000-4-8	Power Frequency Magnetic Field Test
EN 61000-4-11	Voltage Dips
EN 61547	Electromagnetic Immunity Requirements Applies To Lighting Equipment

**Note:** (1) This LED driver meets the EMI specifications above, but EMI performance of a luminaire that contains it depends also on the other devices connected to the driver and on the fixture itself.

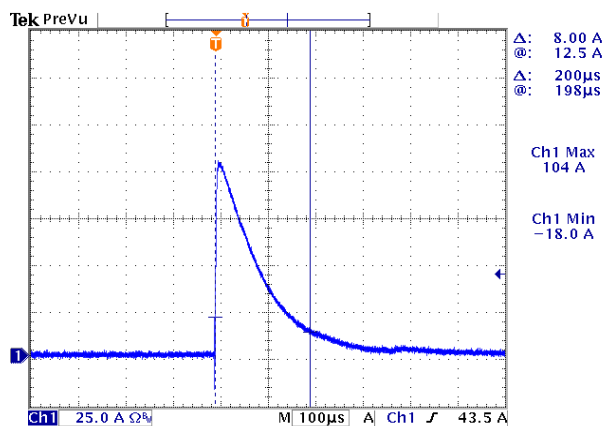
## Derating Curve



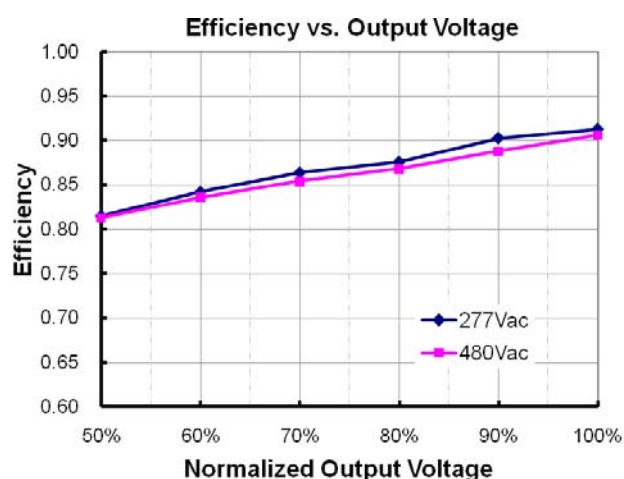
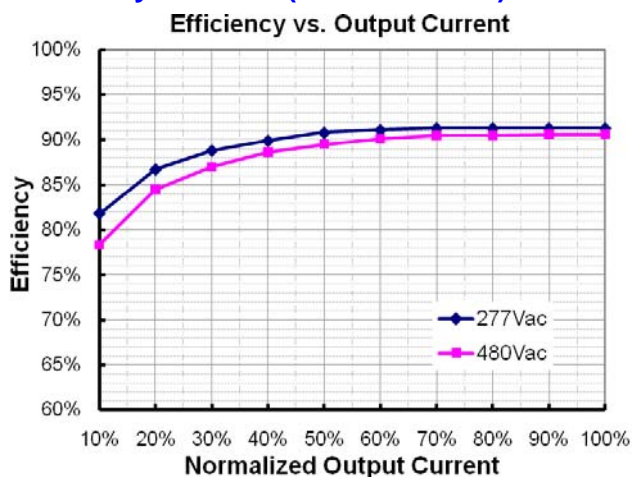
## Lifetime vs Case Temperature Curve



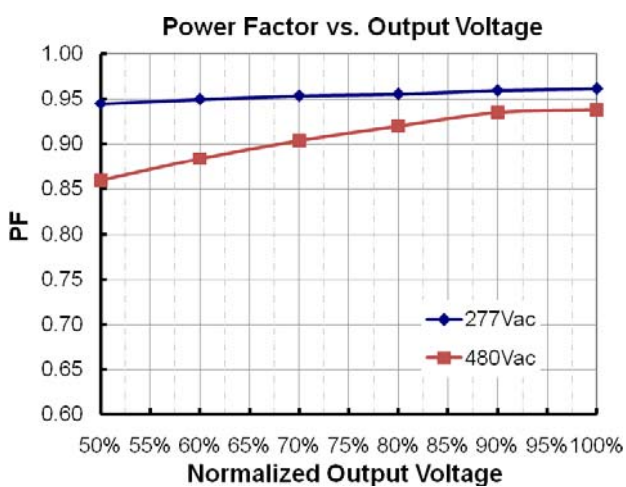
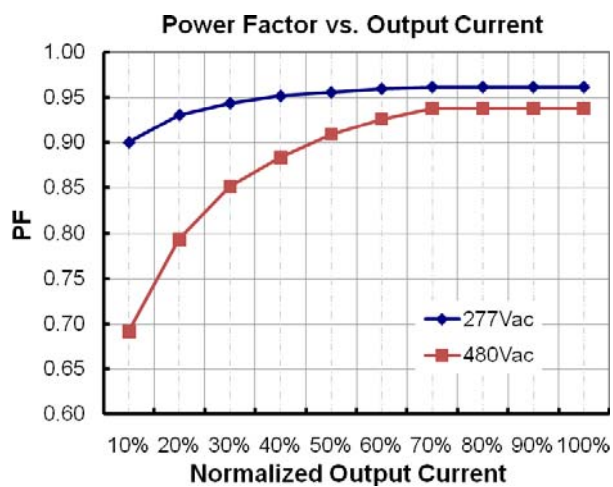
## Inrush Current Waveform



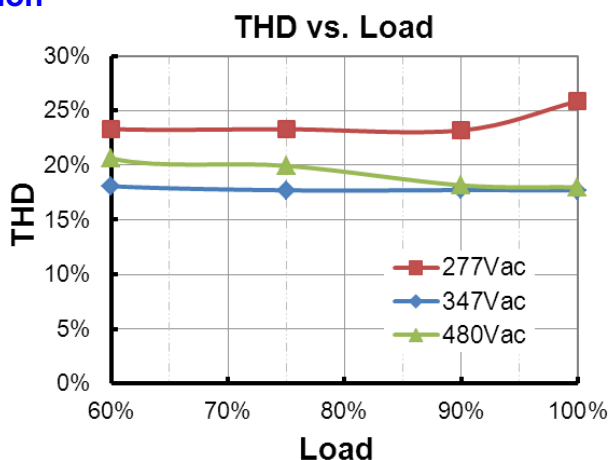
## Efficiency vs Load (580mA Model)



## Power Factor Characteristics



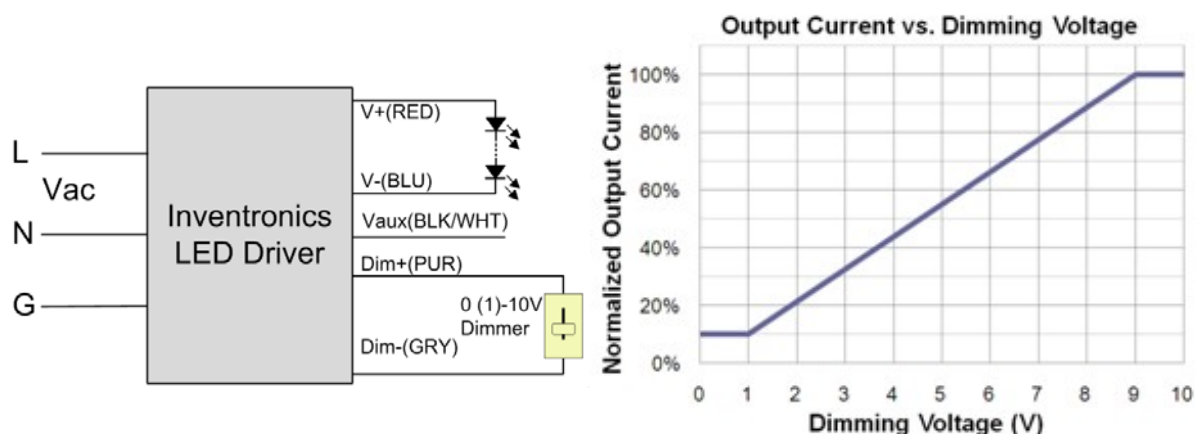
## Total Harmonic Distortion



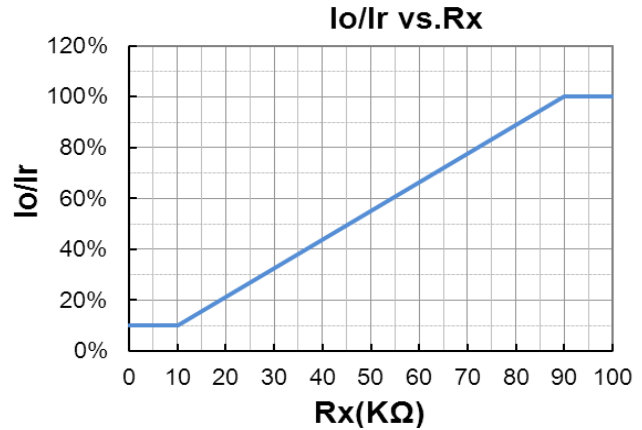
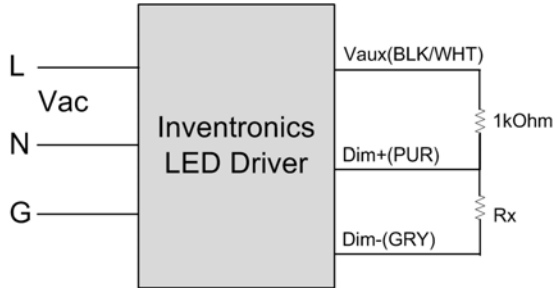
## Dimming Control (On secondary side)

Parameter	Min.	Typ.	Max.	Notes
12V output voltage	10.8 V	12 V	13.2 V	
12V output source current	0 mA	-	20 mA	
Absolute maximum voltage on the 0~10V input pin	-20 V	-	20 V	
Source current on 0~10V input pin	100 uA	140 uA	180 uA	

The dimmer control is operated from an input signal of 1 – 10 Vdc. Recommended implementations are provided below.



**Implementation 1: DC input**



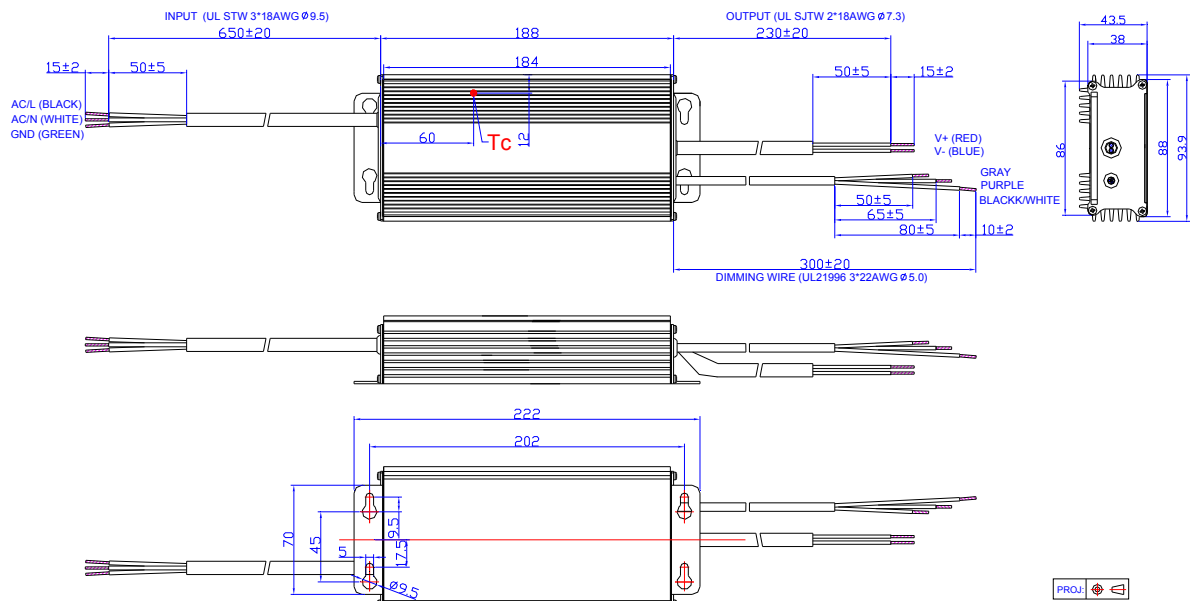
## Implementation 2: External resistor

### Notes:

1.  $I_o$  is actual output current and  $I_r$  is rated current without dimming control.
2. For the driver to operate properly, the load voltage must be maintained above the minimum voltage threshold (approx. 50% of the max. output voltage for any given model).
3. If the output voltage is maintained above 50% of the maximum output voltage, the dimming control may be operated over the entire 1-10V range with output current varying from 10% to 100% of  $I_r$ .
4. The dimming signal is allowed to be less than 1V, however, when it for 0-1V, the output current is 10% $I_r$ .
5. Do not connect the GND of dimming to the output; otherwise, the LED driver can not work normally.

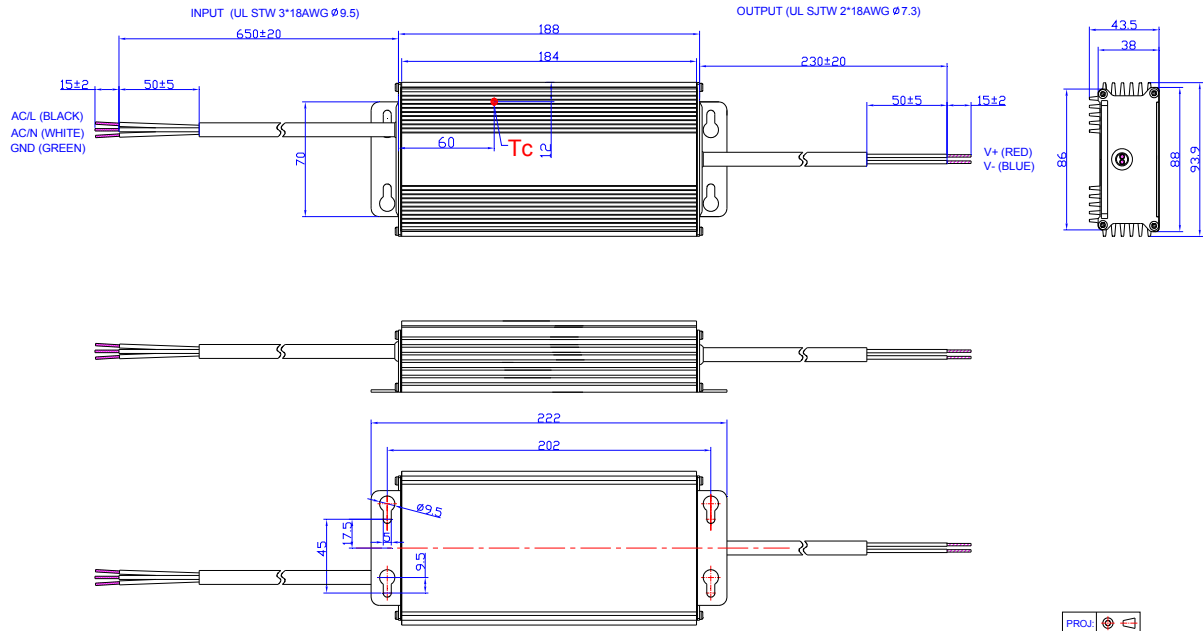
## Mechanical Outline

### ESC-150SxxxDT



Unspecified tolerance: ±1

## ESC-150SxxxST



Unspecified tolerance: ±1

## RoHS Compliance

Our products comply with the European Directive 2011/65/EC, calling for the elimination of lead and other hazardous substances from electronic products.

## Revision History

Change Date	Rev.	Description of Change		
		Item	From	To
2011-10-10	A	Datasheet Release	/	/
2011-10-11	B	Derating Curve, Life time PF, EFF Curve	/	Update
2011-10-19	C	Output Voltage at No Load $I_o = 700 \text{ mA}$ $I_o = 2800 \text{ mA}$	220 V 60 V	225 V 65 V
2011-12-28	D	Life Time	/	Update
2012-01-17	E	ESC-150S210ST(DT) added	/	New model added
2012-06-05	F	Notes of Life time	/	Updated
		Max Output Voltage of ESC-150S058DT	258 V	257 V
2012-07-17	G	Max Case Temperature	/	Updated
2012-07-30	H	Mechanical Outline-Wire diameter added	/	Updated
		Min PF be added in Input Specifications	/	/
2012-09-26	I	Life time curve	/	Updated -14W max
		MTBF, Life time Typical	/	Added
		Temperature coefficient	/	Added
		Inrush Current ( $I^2t$ )	/	Added
2013-12-19	J	Mechanical Outline	/	Corrected
2014-09-18	K	Inrush current	/	Deleted
		Inrush Current( $I^2t$ )	$0.35A^2s$	$1.5A^2s$
		Inrush Current Waveform	/	Added
2015-11-09	L	Format	/	Updated
		Features	/	Updated
		Description	/	Updated
		Input Specifications	/	Updated
		Output Specifications	Total Output Current Ripple (pk-pk)	Added
		Output Specifications	Output Current Ripple at < 200 Hz (pk-pk)	Added
		General Specifications	Case Temperature	Operating Case Temperature for Safety $T_{c\_s}$
		General Specifications	Operating Case Temperature for Warranty $T_{c\_w}$	Added
		Safety & EMC Compliance	/	Updated
		Protection Functions	/	Updated
		Dimming Control (On secondary side)	/	Updated

2016-02-03	M	THD	/	Updated
		Total Harmonic Distortion	/	Added
2017-07-26	N	Features	/	Updated
		Input Specifications	PF/THD	Updated
		Output Specifications	Turn-on Delay Time	Updated
		Output Specifications	Temperature coefficient	Updated
		General Specifications	Storage Temperature	Added
		Dimensions	With mounting ear	Added
		Environmental Specifications	/	Deleted
		Safety & EMC Compliance	/	Updated
		Mechanical Outline	/	Updated