

Features

- Ultra High Efficiency (Up to 94%)
- Full Power at Wide Output Current Range (Constant Power)
- 0-10V/PWM/Timer Dimmable
- Dim-to-Off with Standby Power ≤ 1.5 W
- 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
- 5 Years Warranty



Description

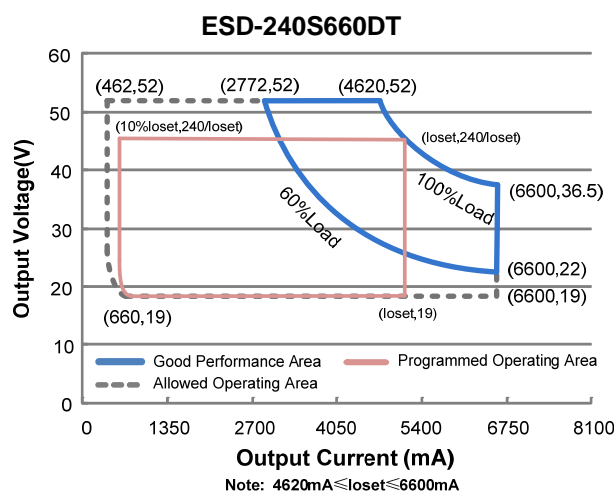
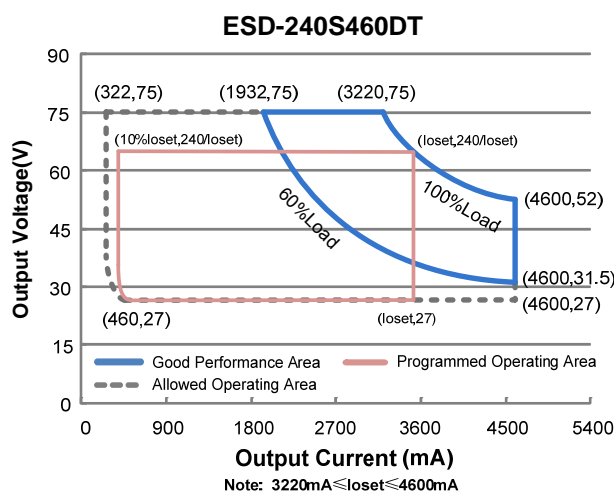
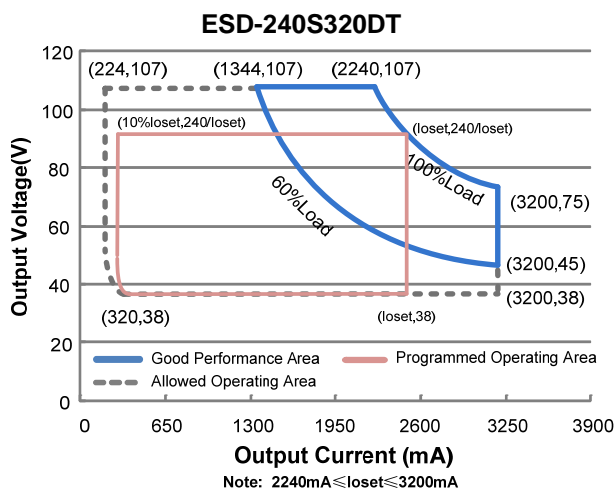
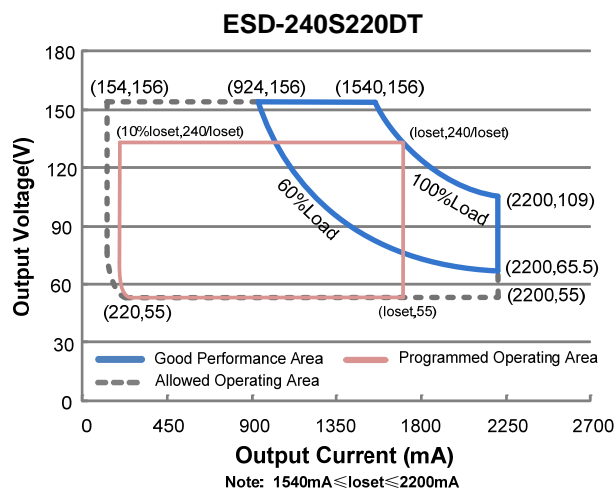
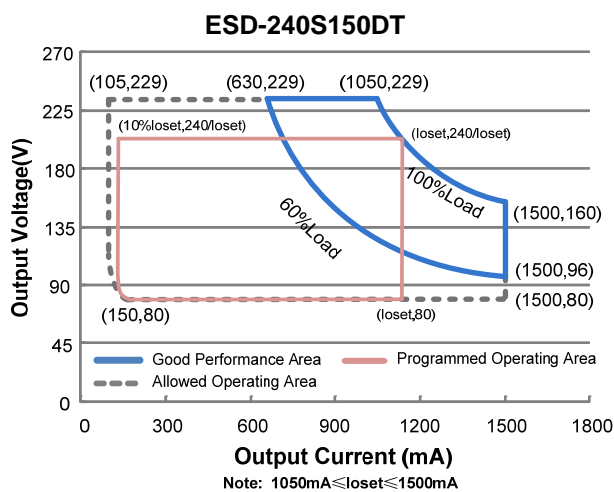
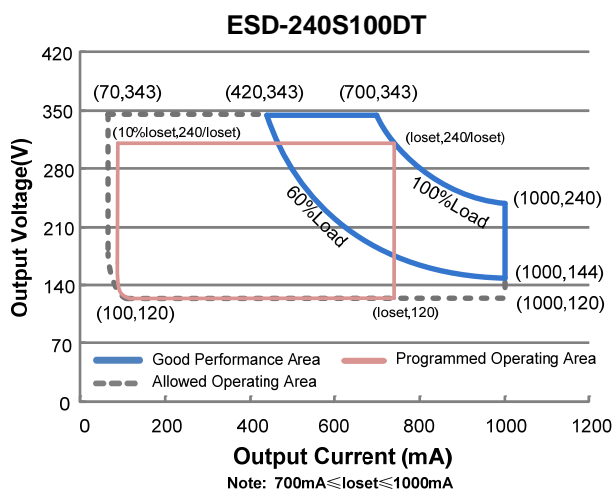
The ESD-240SxxxDT series is a 240W, constant-current, programmable LED driver that operates from 249-528 Vac input with excellent power factor. Created for many lighting applications including high bay, high mast, sports and roadway, it provides a dim-to-off mode with low standby power. The high efficiency 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 over voltage, short circuit, and over temperature.

Models

Adjustable Output Current Range	Full-Power Current Range (1)	Default Output Current	Input Voltage Range(2)	Output Voltage Range	Max. Output Power	Typical Efficiency (3)	Power Factor		Model Number
							277Vac	480Vac	
70-1000mA	700-1000mA	700 mA	249~528 Vac 352~500 Vdc	120~343Vdc	240 W	94.0%	0.96	0.95	ESD-240S100DT
105-1500mA	1050-1500mA	1400 mA	249~528 Vac 352~500 Vdc	80~229Vdc	240 W	93.5%	0.96	0.95	ESD-240S150DT
154-2200mA	1540-2200mA	2100 mA	249~528 Vac 352~500 Vdc	55~156Vdc	240 W	93.0%	0.96	0.95	ESD-240S220DT
224-3200mA	2240-3200mA	2800 mA	249~528 Vac 352~500 Vdc	38~107Vdc	240 W	93.0%	0.96	0.95	ESD-240S320DT ⁽⁴⁾
322-4600mA	3220-4600mA	4200 mA	249~528 Vac 352~500 Vdc	27~75Vdc	240 W	93.0%	0.96	0.95	ESD-240S460DT ⁽⁴⁾
462-6600mA	4620-6600mA	4900 mA	249~528 Vac 352~500 Vdc	19~52Vdc	240 W	92.5%	0.96	0.95	ESD-240S660DT ⁽⁴⁾

- Notes:** (1) Output current range with constant power at 240W
 (2) Certified voltage range: 277-480Vac or 352-500Vdc
 (3) Measured at 100% load and 480Vac input (see below "General Specifications" for details).
 (4) SELV Output

I-V Operating Area



Input Specifications

Parameter	Min.	Typ.	Max.	Notes
Input Voltage	249 Vac	-	528 Vac	352-500Vdc
Input Frequency	47 Hz	-	63 Hz	
Leakage Current	-	-	0.75 MIU	UL8750; 480Vac/ 60Hz
	-	-	0.70 mA	IEC60598-1; 480Vac/ 60Hz
Input AC Current	-	-	1.1 A	Measured at 100% load and 277 Vac input.
	-	-	0.6 A	Measured at 100% load and 480 Vac input.
Inrush Current(I ² t)	-	-	2.9 A ² s	At 480Vac input, 25°C Cold Start, Duration=1.43 ms, 10%Ipk-10%Ipk. See Inrush Current Waveform for the details.
PF	0.90	-	-	At 277-480Vac, 50-60Hz, 60%-100% Load (144-240W)
THD	-	-	20%	

Output Specifications

Parameter	Min.	Typ.	Max.	Notes
Output Current Tolerance	-5%loset	-	5%loset	100% load
Output Current Setting(loset) Range				
ESD-240S100DT	70 mA	-	1000 mA	
ESD-240S150DT	105 mA	-	1500 mA	
ESD-240S220DT	154 mA	-	2200 mA	
ESD-240S320DT	224 mA	-	3200 mA	
ESD-240S460DT	322 mA	-	4600 mA	
ESD-240S660DT	462 mA	-	6600 mA	
Output Current Setting Range with Constant Power				
ESD-240S100DT	700 mA	-	1000 mA	
ESD-240S150DT	1050 mA	-	1500 mA	
ESD-240S220DT	1540 mA	-	2200 mA	
ESD-240S320DT	2240 mA	-	3200 mA	
ESD-240S460DT	3220 mA	-	4600 mA	
ESD-240S660DT	4620 mA	-	6600 mA	
Output Current Ripple(pk-pk)	-	5%lomax	10%lomax	100% load
Startup Overshoot Current	-	-	10%lomax	100% load
No Load Output Voltage				
ESD-240S100DT	-	-	355 V	
ESD-240S150DT	-	-	248 V	
ESD-240S220DT	-	-	170 V	
ESD-240S320DT	-	-	120 V	
ESD-240S460DT	-	-	90 V	
ESD-240S660DT	-	-	60 V	
Line Regulation	-	-	±0.5%	Measured at 100% load
Load Regulation	-	-	±1.5%	
Turn-on Delay Time	-	0.5 s	0.75 s	Measured at 277Vac and 480Vac input, 60%-100% Load
Temperature Coefficient of loset	-	0.03%/°C	-	Case temperature = 0°C ~Tc max

Output Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes
12V Auxiliary Output Voltage	10.8 V	12 V	13.2 V	
12V Auxiliary Output Source Current	0 mA	-	200 mA	Return terminal is "Dim"

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

General Specifications

Parameter	Min.	Typ.	Max.	Notes
Efficiency at 277 Vac input:				
ESD-240S100DT				
I _o =700 mA	90.0%	92.0%	-	
I _o =1000mA	89.5%	91.5%	-	
ESD-240S150DT				
I _o =1050mA	90.0%	92.0%	-	
I _o =1500mA	89.0%	91.0%	-	
ESD-240S220DT				
I _o =1540mA	89.5%	91.5%	-	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)
I _o =2200mA	89.5%	91.5%	-	
ESD-240S320DT				
I _o =2240mA	89.5%	91.5%	-	
I _o =3200mA	88.5%	90.5%	-	
ESD-240S460DT				
I _o =3220mA	89.5%	91.5%	-	
I _o =4600mA	88.0%	90.0%	-	
ESD-240S660DT				
I _o =4620mA	89.0%	91.0%	-	
I _o =6600mA	88.0%	90.0%	-	
Efficiency at 347 Vac input:				
ESD-240S100DT				
I _o =700 mA	91.0%	93.0%	-	
I _o =1000mA	90.5%	92.5%	-	
ESD-240S150DT				
I _o =1050mA	91.0%	93.0%	-	
I _o =1500mA	90.0%	92.0%	-	
ESD-240S220DT				
I _o =1540mA	90.0%	92.0%	-	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)
I _o =2200mA	90.0%	92.0%	-	
ESD-240S320DT				
I _o =2240mA	90.0%	92.0%	-	
I _o =3200mA	89.5%	91.5%	-	
ESD-240S460DT				
I _o =3220mA	90.0%	92.0%	-	
I _o =4600mA	89.0%	91.0%	-	
ESD-240S660DT				
I _o =4620mA	90.0%	92.0%	-	
I _o =6600mA	89.0%	91.0%	-	

General Specifications (Continued)

Parameter	Min.	Typ.	Max.	Notes	
Efficiency at 480 Vac input: ESD-240S100DT I _o =700 mA I _o =1000mA	92.0% 91.0%	94.0% 93.0%	- -	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)	
ESD-240S150DT I _o =1050mA I _o =1500mA	91.5% 91.5%	93.5% 93.5%	- -		
ESD-240S220DT I _o =1540mA I _o =2200mA	91.0% 91.0%	93.0% 93.0%	- -		
ESD-240S320DT I _o =2240mA I _o =3200mA	91.0% 90.0%	93.0% 92.0%	- -		
ESD-240S460DT I _o =3220mA I _o =4600mA	91.0% 89.5%	93.0% 91.5%	- -		
ESD-240S660DT I _o =4620mA I _o =6600mA	90.5% 89.5%	92.5% 91.5%	- -		
Standby power	-	-	1.5 W		Measured at 480Vac/50Hz; Dimming off
MTBF	-	209,000 Hours	-		Measured at 480Vac input, 80%Load and 25°C ambient temperature (MIL-HDBK-217F)
Lifetime	-	114,000 Hours	-		Measured at 480Vac input, 80%Load and 70°C case temperature; See lifetime vs. Tc curve for the details
Operating Case Temperature for Safety T _{c_s}	-40°C	-	+89°C		
Operating Case Temperature for Warranty T _{c_w}	-40°C	-	+75°C	Case temperature for 5 years warranty	
Storage Temperature	-40°C	-	+85°C		
Dimensions Inches (L × W × H) Millimeters (L × W × H)	9.49 × 2.66 × 1.56 241 × 67.5 × 39.7			With mounting ear 10.32 × 2.66 × 1.56 262 × 67.5 × 39.7	
Net Weight	-	1400 g	-		

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

Dimming Specifications

Parameter	Min.	Typ.	Max.	Notes
Absolute Maximum Voltage on the V _{dim} (+) Pin	-20 V	-	20 V	
Source Current on V _{dim} (+)Pin	200 uA	300 uA	450 uA	V _{dim} (+) = 0 V

Dimming Specifications (Continued)

Parameter		Min.	Typ.	Max.	Notes
Dimming Output Range	ESD-240S100DT ESD-240S150DT ESD-240S220DT ESD-240S320DT ESD-240S460DT ESD-240S660DT	10%loset	-	loset	700mA ≤ loset ≤ 1000mA 1050mA ≤ loset ≤ 1500mA 1540mA ≤ loset ≤ 2200mA 2240mA ≤ loset ≤ 3200mA 3220mA ≤ loset ≤ 4600mA 4620mA ≤ loset ≤ 6600mA
	ESD-240S100DT ESD-240S150DT ESD-240S220DT ESD-240S320DT ESD-240S460DT ESD-240S660DT	70 mA 105 mA 154 mA 224 mA 322 mA 462 mA	-	loset	70mA ≤ loset < 700mA 105mA ≤ loset < 1050mA 154mA ≤ loset < 1540mA 224mA ≤ loset < 2240mA 322mA ≤ loset < 3220mA 462mA ≤ loset < 4620mA
Recommended Dimming Input Range		0 V	-	10 V	Default 0-10V dimming mode.
Dim off Voltage		0.2 V	0.4 V	0.6 V	
Dim on Voltage		0.4 V	0.6 V	0.8 V	
Hysteresis		-	0.2 V	-	
PWM_in High Level		3 V	-	10 V	Dimming mode set to PWM in PC interface.
PWM_in Low Level		-0.3 V	-	0.6 V	
PWM_in Frequency Range		200 Hz	-	3 KHz	
PWM_in Duty Cycle		1%	-	99%	
PWM Dimming off (Positive Logic)		2%	4%	7%	
PWM Dimming on (Positive Logic)		4%	6%	9%	
PWM Dimming off (Negative Logic)		93%	96%	98%	
PWM Dimming on (Negative Logic)		91%	94%	96%	
Hysteresis		-	2%	-	

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

Safety & EMC Compliance

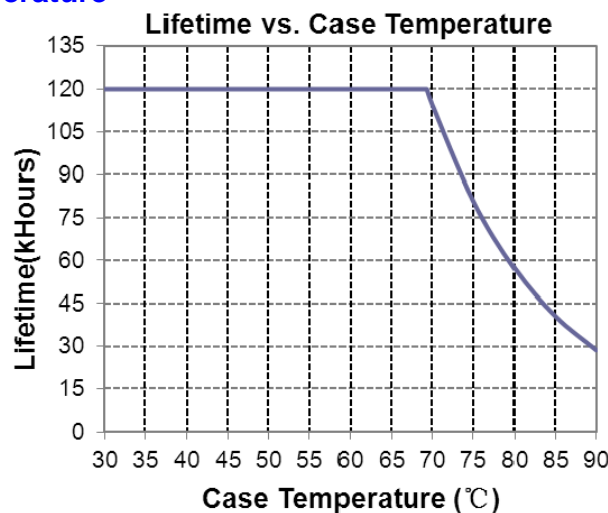
Safety Category	Standard
UL/CUL	UL8750,CAN/CSA-C22.2 No. 250.13
CE	EN 61347-1, EN61347-2-13
EMI Standards	Notes
EN 55015 ⁽¹⁾	Conducted emission Test & Radiated emission Test
EN 61000-3-2	Harmonic current emissions
EN 61000-3-3	Voltage fluctuations & flicker

Safety & EMC Compliance (Continued)

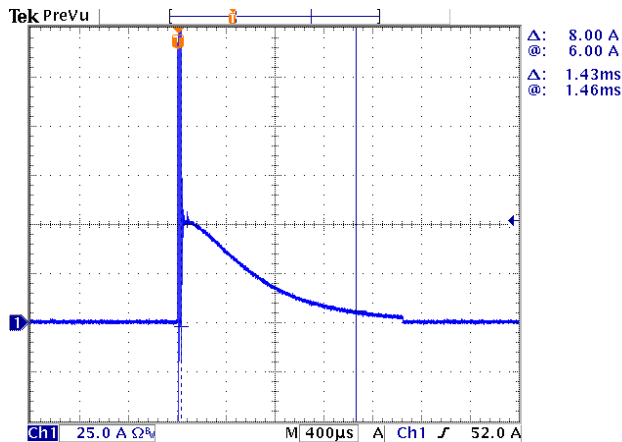
EMI Standards	Notes
FCC Part 15 ⁽¹⁾	ANSI C63.4 Class B
	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: [1] this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired Operation.
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 ⁽²⁾
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

- Notes:** (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.
 (2) To perform electric strength (hi-pot) testing, the "GDT ground disconnect" (nut and metal lock sheet) on the driver end-cap should be removed temporarily to prevent the internal gas discharge tube from conducting (as allowed by IEC 60598-1 Clause 10.2). After testing is completed, these items must be reinstalled to restore line-to-earth surge protection and secure the end cap.

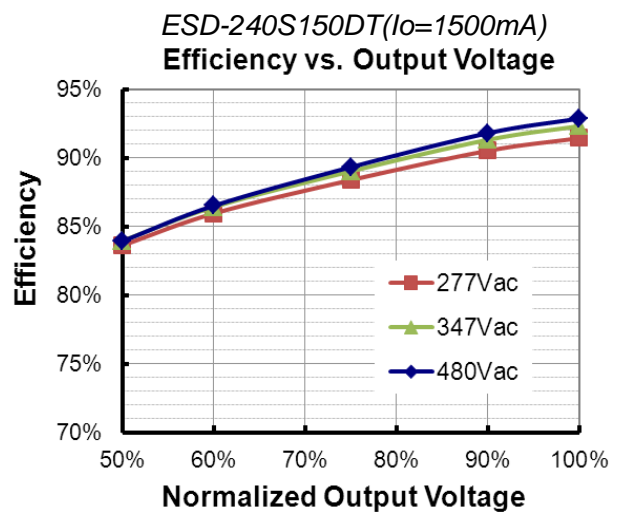
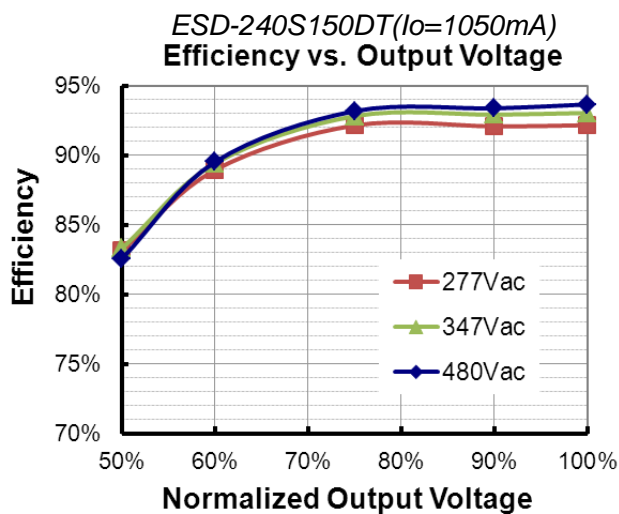
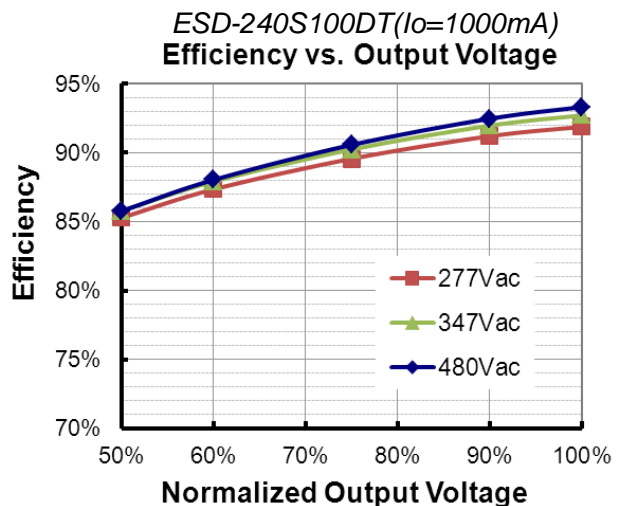
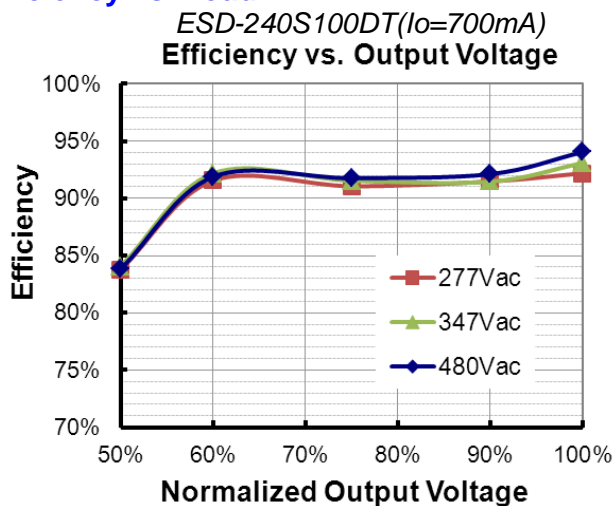
Lifetime vs. Case Temperature

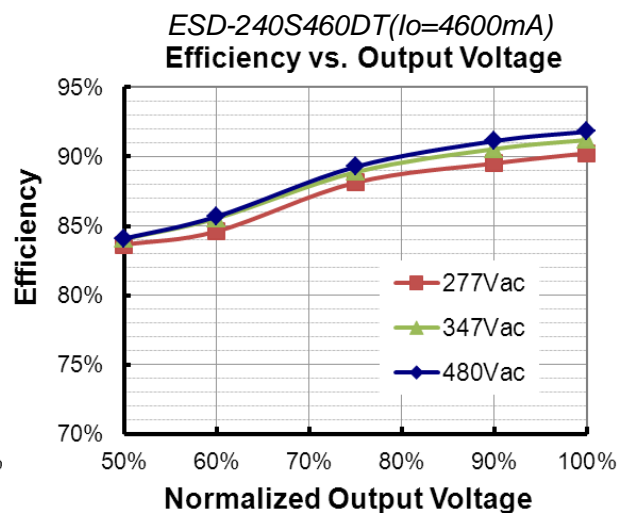
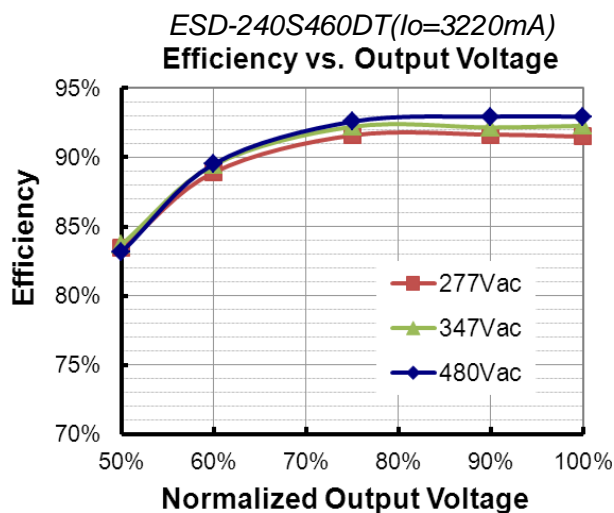
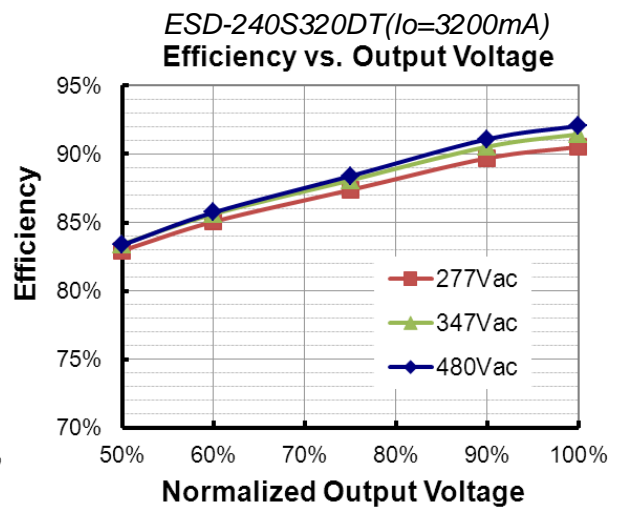
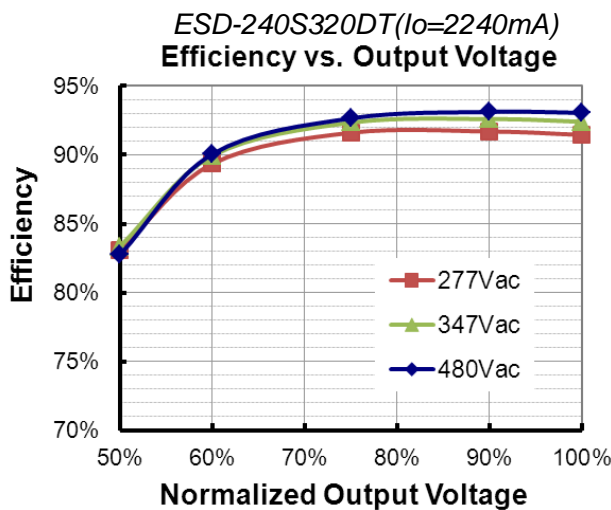
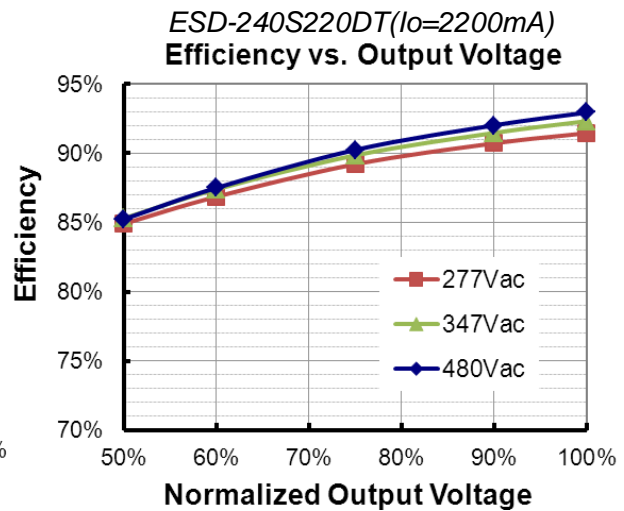
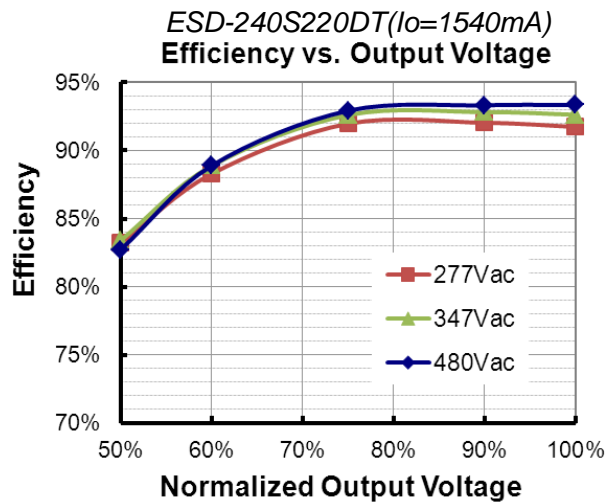


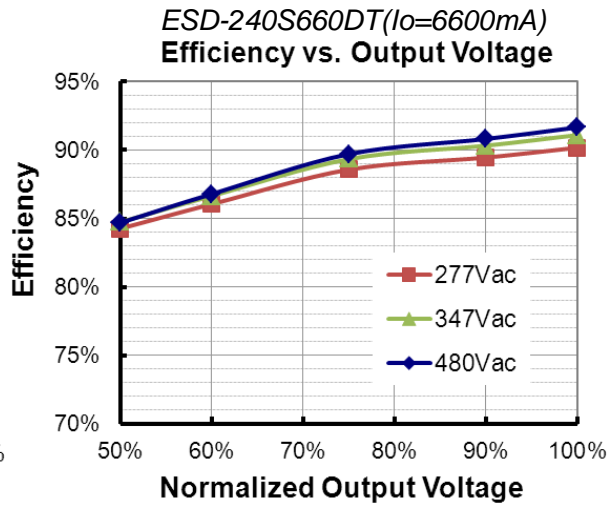
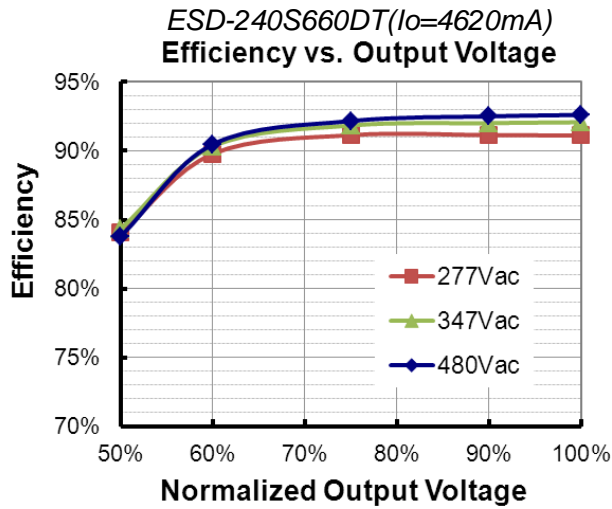
Inrush Current Waveform



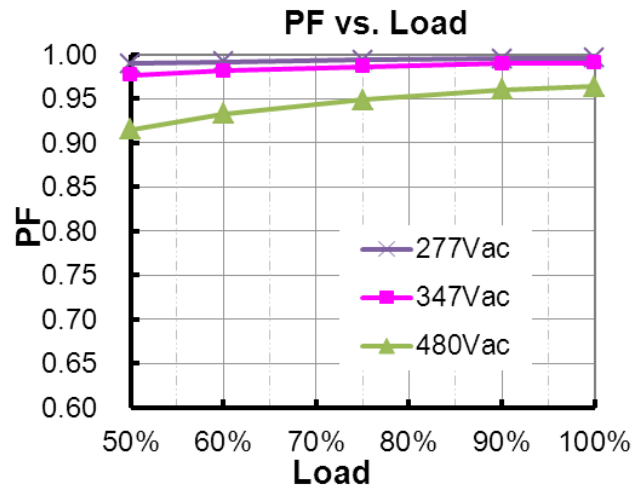
Efficiency vs. Load



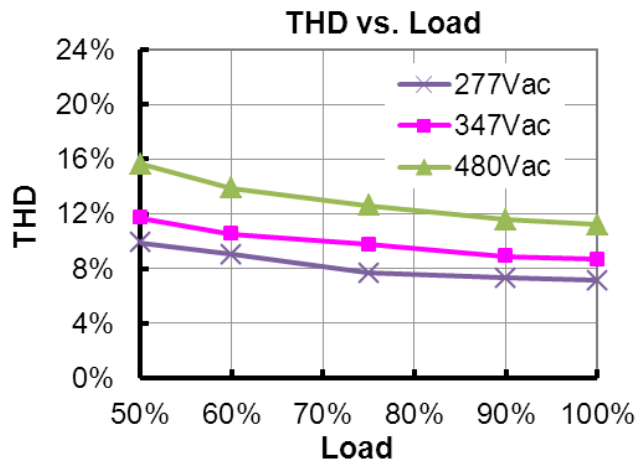




Power Factor



Total Harmonic Distortion



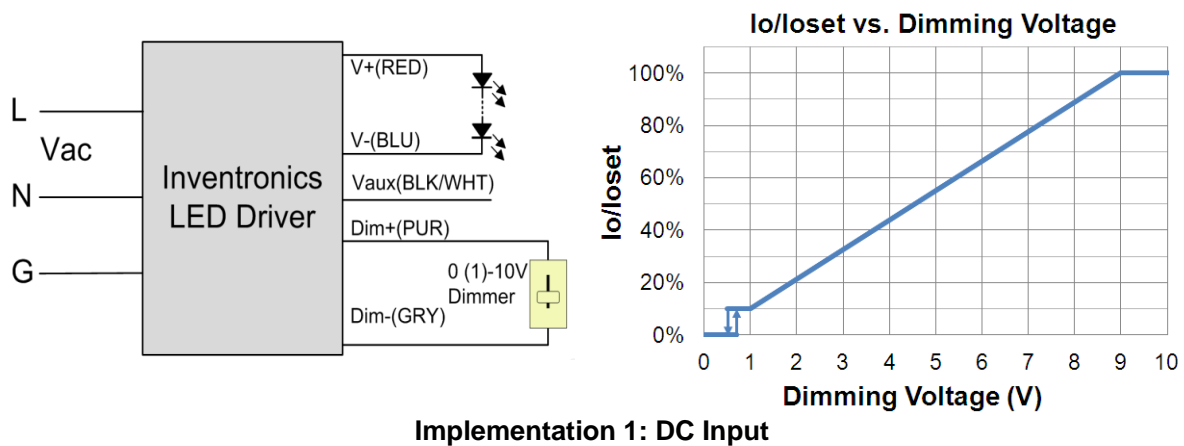
Protection Functions

Parameter	Notes
Over Temperature Protection	Decreases output current, returning to normal after over temperature is removed.
Short Circuit Protection	Auto Recovery. 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.

Dimming

● 0-10V Dimming

The recommended implementation of the dimming control is provided below.

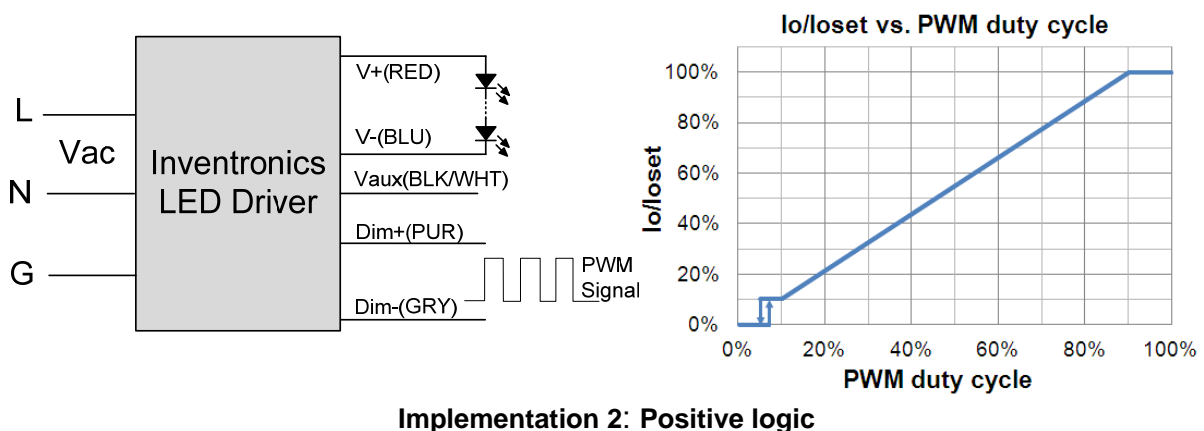


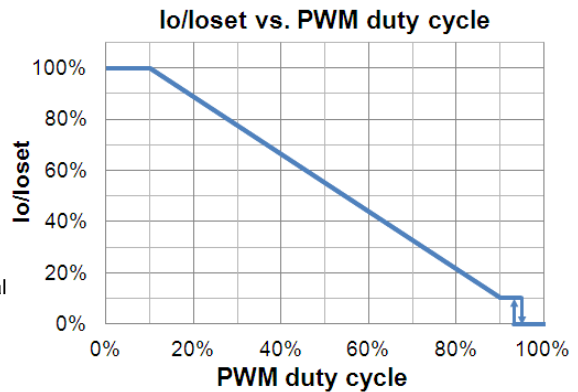
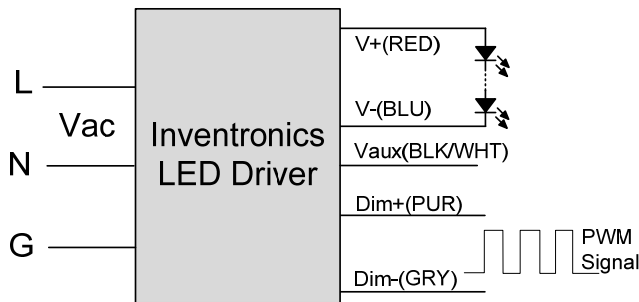
Notes:

1. The dimmer can also be replaced by an active 0-10V voltage source signal or passive components like resistors and zener.
2. Do NOT connect Dim- to the output V- or V+, otherwise the driver will not work properly.
3. If 0-10V dimming is not used, Dim + should be open.

● PWM Dimming

The recommended implementation of the dimming control is provided below.





Implementation 3: Negative logic

Notes:

1. Do NOT connect Dim- to the output V- or V+, otherwise the driver will not work properly.
2. If PWM dimming is not used, Dim + should be open.
3. When PWM negative logic dimming mode and Dim+ is open, the driver will output minimum current.

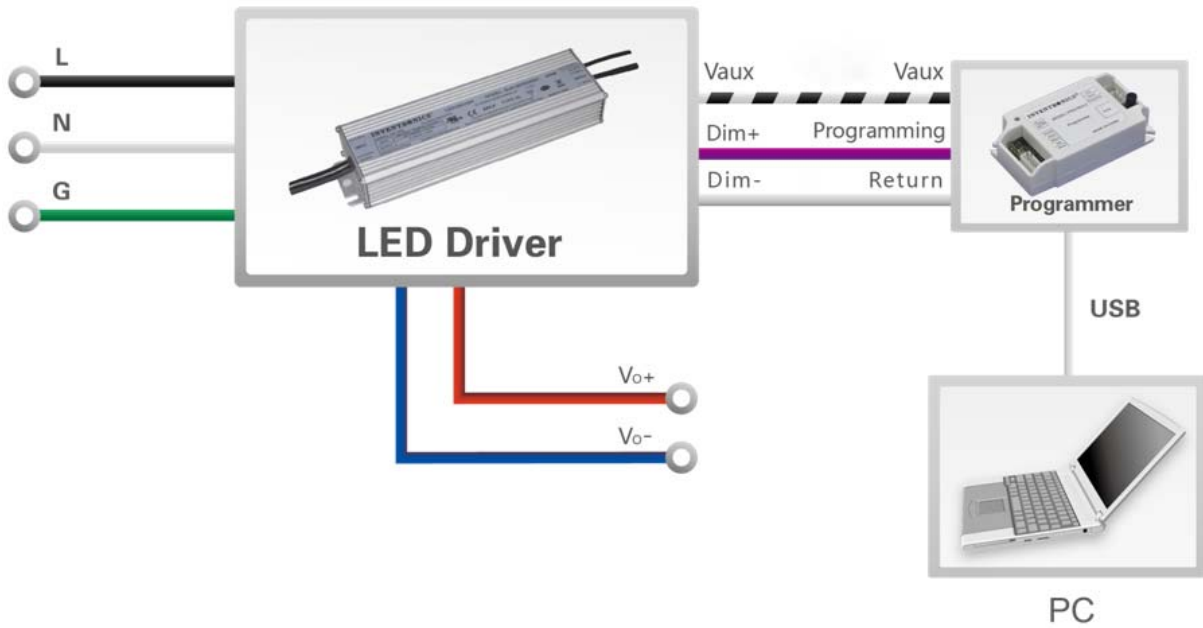
● Time Dimming

The software interface includes the following components:

- Light Level Settings:** Five levels (1-5) and a final level, each with a Dimming percentage, Holding Time, and Fading Time slider.
- Operating Region Graph:** Shows Voltage (V) on the y-axis (0 to 408) and Current (A) on the x-axis (0 to 1.2). A blue curve indicates the driver's output characteristics.
- PWM Duty Cycle Graph:** Shows PWM duty cycle (%) on the y-axis (0 to 100) and time (H) on the x-axis (0 to 19). A red line shows a pulse-width modulation signal.

Set the timing curve by pulling the sliders.

Programming Connection Diagram

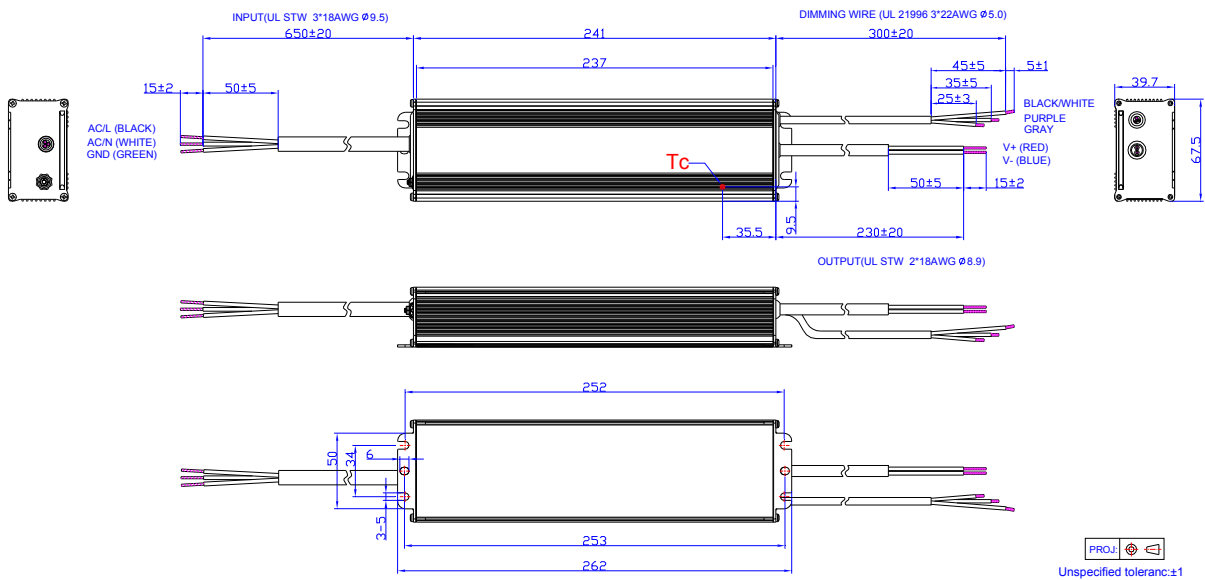


Note: The driver does not need to be powered on during the programming process.

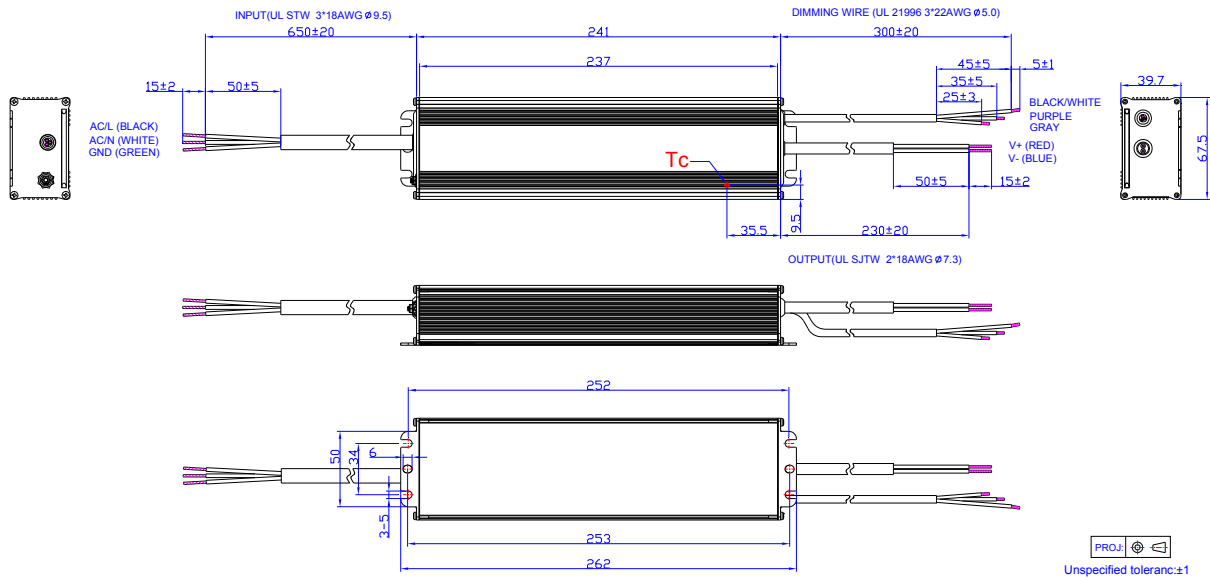
- Please refer to [PRG-MUL2](#) (Programmer) datasheet for details.

Mechanical Outline

ESD-240S100DT



Other Models



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
2014-09-10	A	Datasheets Release	/	/
2016-5-30	B	General Specifications	Case Temperature	Operating Case Temperature for Safety
		General Specifications	Operating Case Temperature for Warranty Tc_w	Added
		General Specifications	Storage Temperature	Added
		General Specifications	With mounting ear	Added
		General Specifications	Net Weight	Added
		Environmental Specifications	/	Deleted
		Safety &EMC Compliance	Notes	Added
		Programming Connection Diagram	/	Updated
		Mechanical Outline	/	Updated
2017-11-21	C	Features	5 Years Warranty	Updated
		Input AC Current	/	Updated
		Input Specifications	Leakage Current	Updated
		Input Specifications	Inrush Current(I2t)	Updated
		Input Specifications	PF/THD(Note)	Updated
		Output Specifications	Turn-on Delay Time	Updated
		Output Specifications	Temperature Coefficient of Ioset	Updated
		General Specifications	Lifetime	Updated
		General Specifications	Operating Case Temperature for Warranty Tc_w	Updated
		Safety &EMC Compliance	/	Updated
		Lifetime vs. Case Temperature	/	Updated
		Mechanical Outline	/	Updated
2018-04-26	D	UL	/	Updated
		Description	/	Updated
2018-11-28	E	CE	/	Added
		Features	/	Updated

Revision History

Change Date	Rev.	Description of Change		
		Item	From	To
2018-11-28	E	Models	/	Updated
		I-V Operating Area	/	Updated
		Input Specifications	Leakage Current	Updated
		Output Specifications	Output Current Setting(losset) Range	Updated
		Output Specifications	Output Current Setting Range with Constant Power	Updated
		Output Specifications	Turn-on Delay Time	Updated
		General Specifications	Dimensions	Updated
		Dimming Specifications	Dimming Output Range	Updated
		Safety & EMC Compliance	/	Updated
		Derating	/	Deleted
		Mechanical Outline	/	Updated