

LED Driver

USVI S24 Series

S24

Highlights & Features

- Constant voltage design
- Universal input voltage from 120-277Vac
- Multi-Channel output and independent operating
- Class 2 output
- Wide operating temperature range -40°C to +55°C
- Dry & Damp location rated for signage application

Safety Standards



Dimensions (L x W x D):

USVI-020024FA	5.20 x 1.34 x 1.00 inch (132.0 x 34.1 x 25.4 mm)
USVI-060024FG	5.83 x 1.80 x 1.00 inch (148.2 x 45.6 x 25.4 mm)
USVI-060024DG	5.83 x 1.80 x 1.00 inch (148.2 x 45.6 x 25.4 mm)
USVI-100024FE/G	9.50 x 1.70 x 1.00 inch (241.3 x 43.1 x 25.4 mm)
USVI-100024DE/G	9.50 x 1.70 x 1.00 inch (241.3 x 43.1 x 25.4 mm)
USVI-200024FA	16.70 x 1.70 x 1.18 inch (424.2 x 43.1 x 30.0 mm)

General Description

Delta USVI S24 series of fixed output voltage LED drivers comes with affordable and reliable features. Compatible with signage from any manufacturer. 24V major output voltage with 1 or 2 multi-channel selection for different lumen application. Meet North America safety certifications, and compliant with FCC Immunity/Emissions/Harmonic requirements. The products are designed and rigorously tested to work in various indoor/signage LED lighting conditions.

Model Information

Model Number	Input Voltage Range	Rated Output Voltage	Rated Output Current	Output Channels
USVI-020024FA	90 - 305Vac	24Vdc	0.85A, 0.85A/ Channel	1
USVI-060024FG	108 - 305Vac		2.50A, 2.50A/ Channel	1
USVI-060024DG			2.50A, 2.50A/ Channel	1
USVI-100024FE/G			4.15A, 4.15A/ Channel	1
USVI-100024DE/G			4.15A, 4.15A/ Channel	1
USVI-200024FA			8.00A, 4.00A/ Channel	2

Model Numbering

US	V	I	-	□□□	□□□	□	□
Safety Approval cULus CSA CE	Constant Voltage	Indoor		Output Power 020 – 20W 060 – 60W 100 – 100W 200 – 200W	Output Voltage 024 – 24Vdc	Function D – 0-10V Dimming F – Fixed Output	Variable

LED Driver

USVI S24 Series

Specifications

Model Number	USVI-020024FA	USVI-060024DG	USVI-060024FG
--------------	---------------	---------------	---------------

Input Ratings / Characteristics

Normal Input Voltage	100-277Vac	120-277Vac
Input Voltage Range	90-305Vac	108-305Vac
Normal Input Frequency	50-60 Hz	50-60 Hz
Input Frequency Range	47-63 Hz	47-63 Hz
Input Current Max	0.27A	0.58A
Efficiency ¹⁾	277Vac 80.0% typ.	90.0% typ.
Inrush Current Peak >50% Duration	32A/ 150us	70A/ 250us
Power Factor @ max. Load.	> 0.9	> 0.95
Total Harmonic Distortion @ max. Load.	< 20%	
Leakage Current	< 0.75mA @ 277Vac	

1) 100% Load (typical) and tested after 30 minutes warm up.

Output Ratings / Characteristics

Nominal Output Voltage (per channel)	24Vdc	
Max. No Load Output Voltage (per channel)	25.2Vdc	
Output Current Range (per channel)	0.05A – 0.83A	0.05A – 2.50A
Max. Output Power (per channel)	20W	60W
Output Channel	1	
Max. Output Power (total output)	20W	60W
Output Voltage Tolerance	± 3%	
Line Regulation	± 1%	
Load Regulation	± 3%	
Output Ripple Voltage	< 720mVp-p	< 1000mVp-p
Rise Time	< 50ms	
Start-up Time	< 1s	

Dimming Characteristics (For DE and DG model only)

Dimming Method	0 ~ 10Vdc for 0 ~100%. Internal PWM Dimming (1kHz). Source current is 120uA. 1) 1V (5%) – 9V (100%) 2) Dimming terminal Open (100%) 3) Dimming terminal Short (0%) 4) Dim= 0.4V OFF
----------------	---

LED Driver

USVI S24 Series

Model Number	USVI-020024FA	USVI-060024DG	USVI-060024FG
--------------	---------------	---------------	---------------

Mechanical

Casing		Plastic, Color : White	Metal sheet, Color : White
Dimensions (L x W x H)	[inch] [mm]	5.20*1.34*1.00 132.0*34.0*25.4	5.83 x 1.80 x 1.00 148.2 x 45.6 x 25.4
Unit Weight	[lbs] [kg]	0.18 0.40	0.75 0.34
Cooling System		Convection	
Input Wire		Line: Black, Neutral: White, Wire Length 300mm	
Output Wire		Positive: Red, Negative: Blue, Wires Length 300mm	Dim+: Violet, Dim-: Gray, Positive: Red, Negative: Blue, Wires Length 300mm Positive: Red, Negative: Blue, Wires Length 300mm
Noise (30cm distance)		Sound Pressure Level (SPL) < 24dBA	

Environment

Ambient Temperature	Operating	-40°C to +60°C	-25°C to +55°C
	Storage	-40°C to +85°C	
Case Temperature (for UL)		+90°C	+90°C
Case Temperature (for warranty)		+70°C	+80°C
Relative Humidity	Operating	10 to 90% RH (Non-Condensing)	
	Storage	5 to 95% RH (Non-Condensing)	
Environmental Locations		UL Dry & Damp	

Protections

Over Voltage	Auto-Recovery when the fault is removed
Overload / Overcurrent	Auto-Recovery when the fault is removed
Short Circuit	Auto-Recovery when the fault is removed
Over Temperature	Auto-Recovery when the fault is removed
Suitable for Luminaires Class	Class II. Insulation Class according to IEC 60598

Reliability Data

Lifetime	50,000 hrs. at lifetime case temperature
MTTF	500,000 hrs. @ 40°C ambient temperature (as per Telcordia SR-332 , survival rate more than 90%)

LED Driver

USVI S24 Series

Model Number	USVI-020024FA*	USVI-060024DG	USVI-060024FG
--------------	----------------	---------------	---------------

Safety Standards / Directives

Electrical Safety	UL	UL 8750, Class P, type "HL". Class 2 Output			
	CB scheme	IEC 61347-1, IEC 61347-2-13, SELV Output			
CE		In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU			
Material and Parts		RoHS Directive Compliant			
Isolation		Input	Output	DIM $\pm$	Case
	Input	N/A	3750V	3750V	3750V
	Output	3750V	N/A	1875V	3750V
	DIM $\pm$	3750V	1875V	N/A	1875V
	Case	3750V	3750V	1875V	N/A

* cULus recognized (does not include Class P certification)

EMC

USVI-060024DE / USVI-060024FE

Emissions (CE & RE)	Compliance to 47 CFR FCC Part 15, Subpart B, Class B	
Surge	ANSI C62.41	Category A1 with a 2.5kV/100kA ring wave

USVI-020024FA / USVI-060024DG / USVI-060024FG

Emissions (CE & RE)	Compliance to EN 55015 Class B	
Immunity	Compliance to EN 61547	
Electrostatic Discharge	IEC 61000-4-2	Air Discharge: 8kV; Contact Discharge: 4kV Criteria A ¹⁾ or B ²⁾
Radiated Disturbance	IEC 61000-4-3	80MHz-1GHz, 3V/m with 1kHz Sine Wave / 80% AM Modulation Criteria A ¹⁾
Electrical Fast Transient / Burst	IEC 61000-4-4	1kV, Criteria A ¹⁾ or B ²⁾
Surge	IEC 61000-4-5	Common Mode ³⁾ : 4kV; Differential Mode ⁴⁾ : 2kV for USVI-060024DG/FG Common Mode ³⁾ : 1kV; Differential Mode ⁴⁾ : 1kV for USVI-020024FA 1.2/50 μ s, 8/20 μ s Combination Wave with 2ohms (L-N), 12ohms (L-PE & N-PE) source impedance Criteria A ¹⁾ or B ²⁾
Conducted Disturbance	IEC 61000-4-6	150kHz-80MHz, 3Vrms, Criteria A ¹⁾
Power Frequency Magnetic Fields	IEC 61000-4-8	3A/Meter, Criteria A ¹⁾
Voltage Dips	IEC 61000-4-11	100% dip; 0.5 cycle; Self Recoverable 30% dip; 10 cycle; Self Recoverable, Criteria A ¹⁾ or B ²⁾
Harmonic Current Emission	IEC 61000-3-2	Class C (230Vac @ 100% load)
Voltage Fluctuation and Flicker	IEC 61000-3-3	$P_{st} \leq 1.0$; $d_{max} \leq 4\%$; $P_{It} \leq 0.65$; $d_c \leq 3.3\%$; $T_{max} \leq 500ms$

1) Criteria A: Normal performance within the specification limits

2) Criteria B: Temporary degradation or loss of function, which is self-recoverable

3) Asymmetrical: Common mode (Line to earth)

4) Symmetrical: Differential mode (Line to line)

LED Driver

USVI S24 Series

Specifications

Model Number	USVI-100024DG	USVI-100024FG	USVI-100024DE	USVI-100024FE	USVI-200024FA
--------------	---------------	---------------	---------------	---------------	---------------

Input Ratings / Characteristics

Normal Input Voltage	120-277Vac				
Input Voltage Range	108-305Vac				
Normal Input Frequency	50-60 Hz				
Input Frequency Range	47-63 Hz				
Input Current Max	0.95A				1.83A
Efficiency ¹⁾	277Vac	89.0% typ.	90.5% typ.	90.5% typ.	90.5% typ.
Inrush Current Peak >50% Duration	150A/ 250us				170A / 110uS
Power Factor @ max. Load.	> 0.95				
Total Harmonic Distortion @ max. Load.	< 20%				
Leakage Current	< 0.75mA @ 277Vac				

1) 100% Load (typical) and tested after 30 minutes warm up.

Output Ratings / Characteristics

Nominal Output Voltage (per channel)	24Vdc	
Max. No Load Output Voltage (per channel)	25.2Vdc	
Output Current Range (per channel)	0.05A – 4.15A	0.05A – 4.00A
Max. Output Power (per channel)	99.6W	96W
Output Channel	1	2
Max. Output Power (total output)	99.6W	192W
Output Voltage Tolerance	± 3%	
Line Regulation	± 1%	
Load Regulation	± 3%	
Output Ripple Voltage	< 1000mVp-p	
Rise Time	< 50ms	
Start-up Time	< 1s	

LED Driver

USVI S24 Series

Model Number	USVI-100024DG	USVI-100024FG	USVI-100024DE	USVI-100024FE	USVI-200024FA
--------------	---------------	---------------	---------------	---------------	---------------

Mechanical

Casing		Metal sheet, Color : White			
Dimensions (L x W x H)	[inch]	9.50 x 1.70 x 1.00			16.70 x 1.70 x 1.18
	[mm]	241.3 x 43.1 x 25.4			424.0 x 43.1 x 30.0
Unit Weight	[lbs]	1.08			2.6
	[kg]	0.49			1.18
Cooling System		Convection			
Input Wire		Line: Black, Neutral: White, Wire Length 300mm			Line: Black, Neutral: White, Wire Length 12.50inch (317mm)
Output Wire		Positive: Red, Negative: Blue, Wires Length 300mm	Dim+: Violet, Dim-:Gray, Positive: Red, Negative: Blue, Wires Length 300mm	Positive: Red, Negative: Blue, Wires Length 300mm	Dim+: Violet, Dim-:Gray, Positive: Red, Negative: Blue, Wires Length 300mm Positive: Red, Negative: Red/White, Wire Length 12.5inch (317mm) Positive: Blue, Negative: Blue/White, Wires Length 18.50inch (470mm)
Noise (30cm distance)		Sound Pressure Level (SPL) < 24dBA			

Environment

Ambient Temperature	Operating	-40°C to +55°C			
	Storage	-40°C to +85°C			
Case Temperature (for UL)		+90°C			
Case Temperature (for warranty)		+80°C			+75°C
Relative Humidity	Operating	10 to 90% RH (Non-Condensing)			
	Storage	5 to 95% RH (Non-Condensing)			
Environmental Locations		UL Dry & Damp			

Protections

Over Voltage	Auto-Recovery when the fault is removed
Overload / Overcurrent	Auto-Recovery when the fault is removed
Short Circuit	Auto-Recovery when the fault is removed
Over Temperature	Auto-Recovery when the fault is removed
Suitable for Luminaires Class	Class II. Insulation Class according to IEC 60598

Reliability Data

Lifetime	50,000 hrs. at lifetime case temperature
MTTF	500,000 hrs. @ 40°C ambient temperature (as per Telcordia SR-332 , survival rate more than 90%)

LED Driver

USVI S24 Series

Model Number	USVI-100024DG	USVI-100024FG	USVI-100024DE	USVI-100024FE	USVI-200024FA*
--------------	---------------	---------------	---------------	---------------	----------------

Safety Standards / Directives

Electrical Safety	UL	UL 8750, Class P, type “HL”. Class 2 Output			
	CSA	N/A			CAN/CSA C22.2 No.250.13
	CE	IEC 61347-1, IEC 61347-2-13, SELV Output	N/A		
Material and Parts		RoHS Directive Compliant			
Isolation		Input	Output	DIM ±	Case
	Input	N/A	3750V	3750V	3750V
	Output	3750V	N/A	1875V	3750V
	DIM ±	3750V	1875V	N/A	1875V
	Case	3750V	3750V	1875V	N/A
Isolation for USVI-200024FA	Input	N/A	2500Vac	N/A	2500Vac
	Output	2500Vac	N/A	N/A	500Vac
	Case	2500Vac	500Vac	N/A	N/A

EMC

USVI-100024DE / USVI-100024FE / USVI-200024FA

Emissions (CE & RE)	Compliance to 47 CFR FCC Part 15, Subpart B, Class B	
Surge	ANSI C62.41	Category A1 with a 2.5kV/100kA ring wave

USVI-100024DG / USVI-100024FG

Emissions (CE & RE)	Compliance to EN 55015 Class B	
Immunity	Compliance to EN 61547	
Electrostatic Discharge	IEC 61000-4-2	Air Discharge: 8kV; Contact Discharge: 4kV Criteria A ¹⁾ or B ²⁾
Radiated Disturbance	IEC 61000-4-3	80MHz-1GHz, 3V/m with 1kHz Sine Wave / 80% AM Modulation Criteria A ¹⁾
Electrical Fast Transient / Burst	IEC 61000-4-4	1kV, Criteria A ¹⁾ or B ²⁾
Surge	IEC 61000-4-5	Common Mode ³⁾ : 4kV; Differential Mode ⁴⁾ : 2kV 1.2/50 μ s, 8/20 μ s Combination Wave with 2ohms (L-N), 12ohms (L-PE & N-PE) source impedance Criteria A ¹⁾ or B ²⁾
Conducted Disturbance	IEC 61000-4-6	150kHz-80MHz, 3Vrms, Criteria A ¹⁾
Power Frequency Magnetic Fields	IEC 61000-4-8	3A/Meter, Criteria A ¹⁾
Voltage Dips	IEC 61000-4-11	100% dip; 0.5 cycle; Self Recoverable 30% dip; 10 cycle; Self Recoverable, Criteria A ¹⁾ or B ²⁾
Harmonic Current Emission	IEC 61000-3-2	Class C (230Vac @ 100% load)
Voltage Fluctuation and Flicker	IEC 61000-3-3	P _{st} $\leq$ 1.0 ; d _{max} $\leq$ 4% ; P _{It} $\leq$ 0.65 ; d _c $\leq$ 3.3% ; T _{max} $\leq$ 500ms

1) Criteria A: Normal performance within the specification limits

2) Criteria B: Temporary degradation or loss of function, which is self-recoverable

3) Asymmetrical: Common mode (Line to earth)

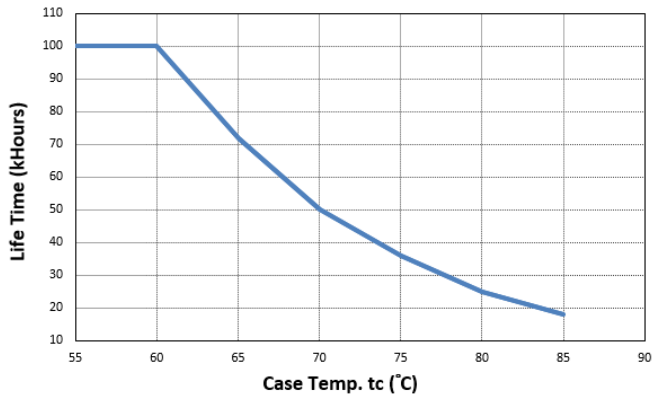
4) Symmetrical: Differential mode (Line to line)

LED Driver

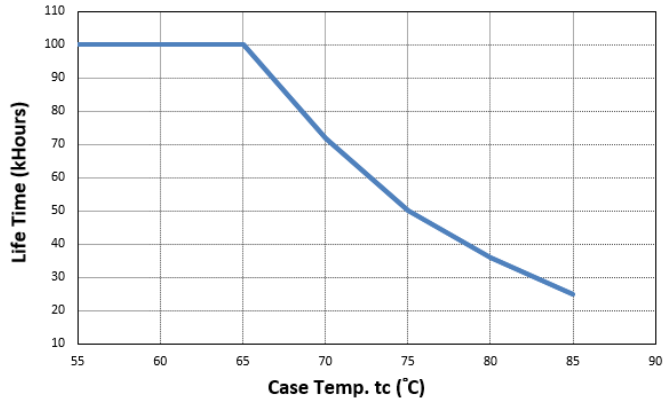
USVI S24 Series

Driver Lifetime vs. Case Temperature

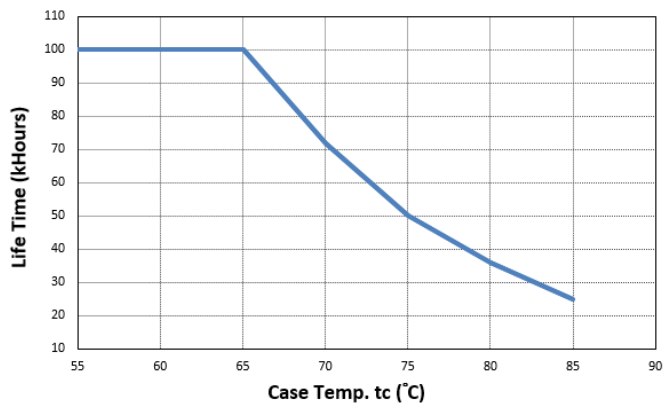
USVI-020024FA



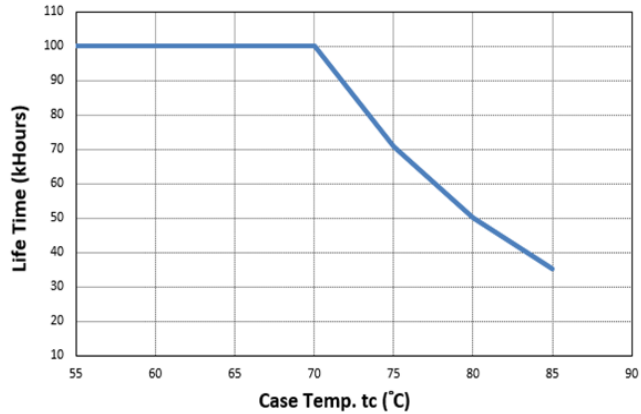
USVI-200024FA



USVI-060024DG/ USVI-060024FG

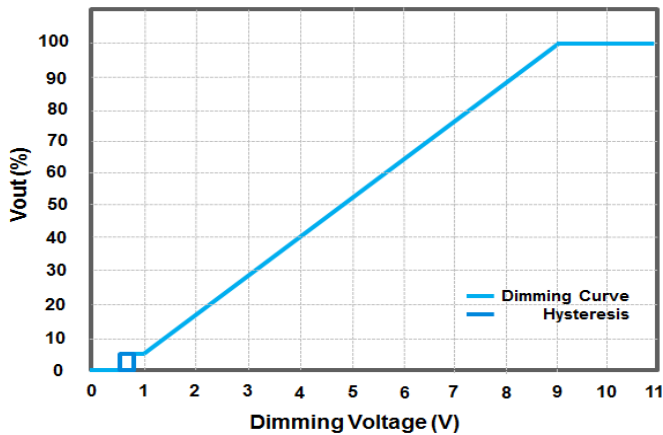


USVI-100024DG/ USVI-100024FG/ USVI-100024DE/ USVI-100024FE

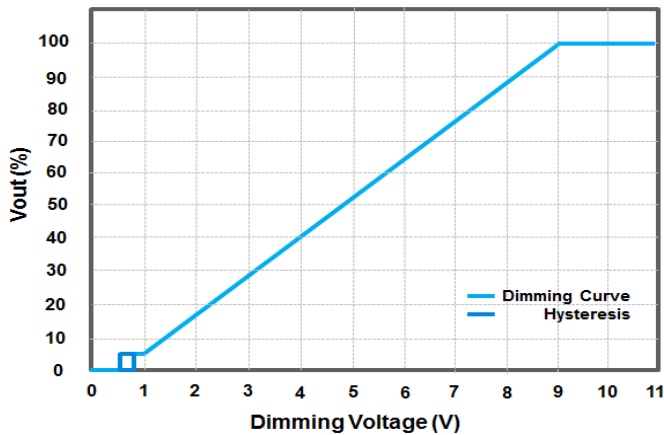


Dimming Curve – dimming voltage vs. output voltage

USVI-060024DG



USVI-100024DE/ USVI-100024DG

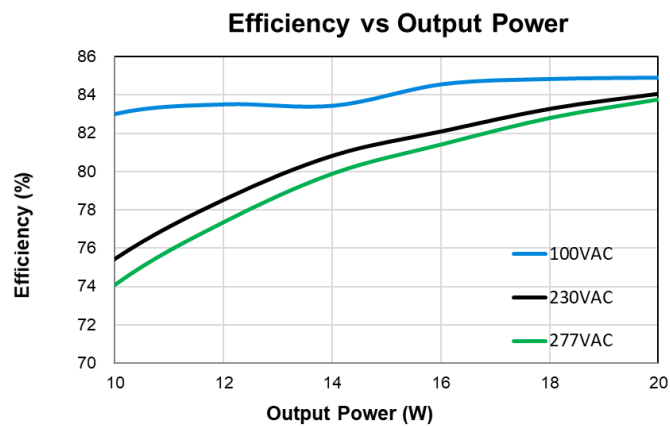


LED Driver

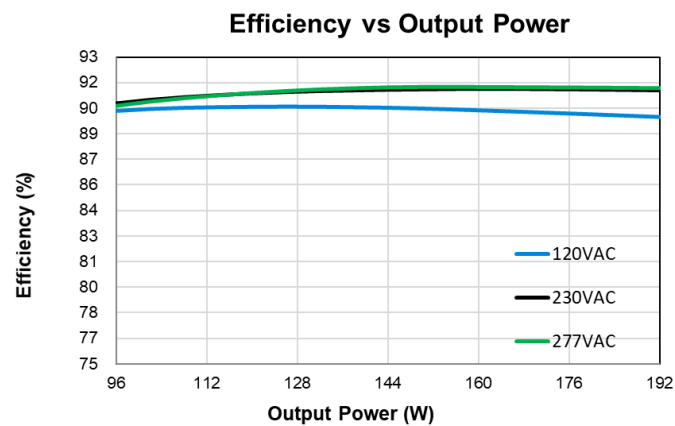
USVI S24 Series

Efficiency vs. Output Power

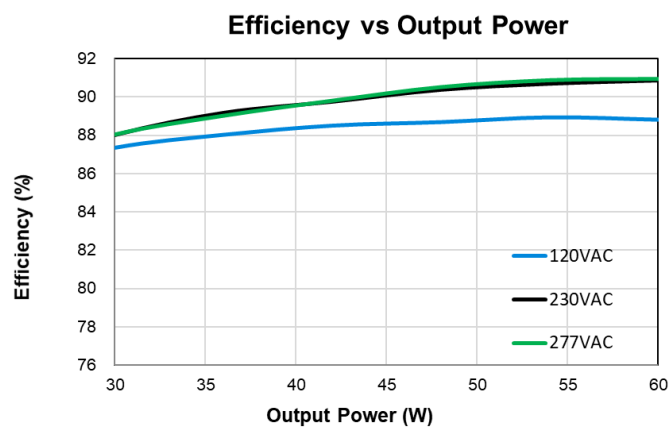
USVI-020024FA



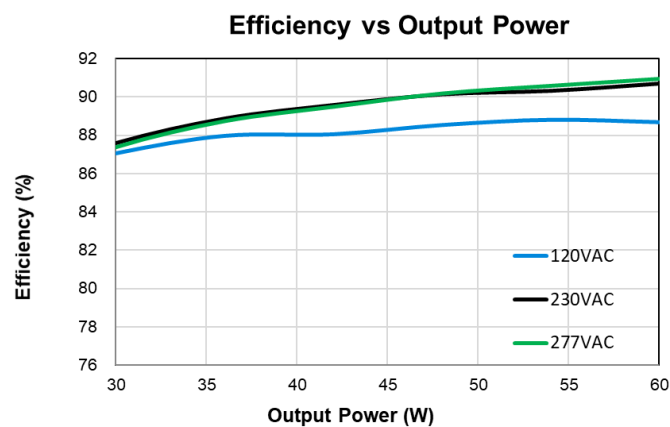
USVI-200024FA



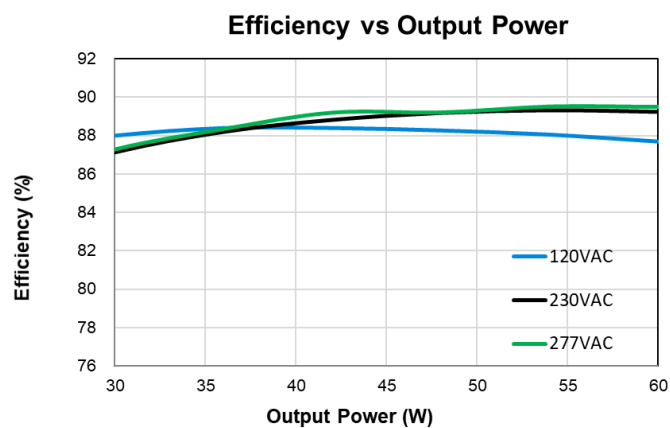
USVI-060024DG



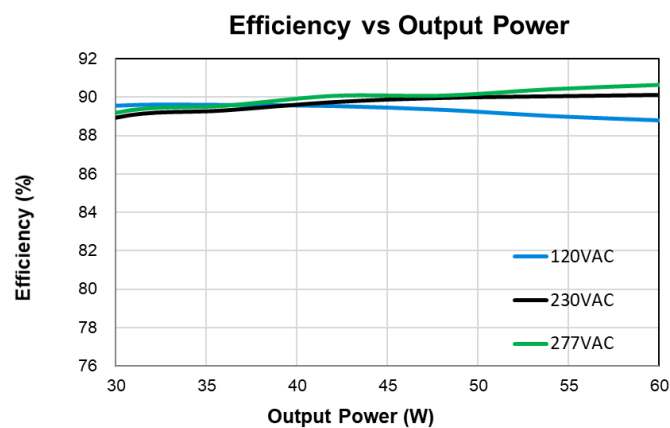
USVI-060024FG



USVI-100024DE / USVI-100024DG



USVI-100024FE / USVI-100024FG

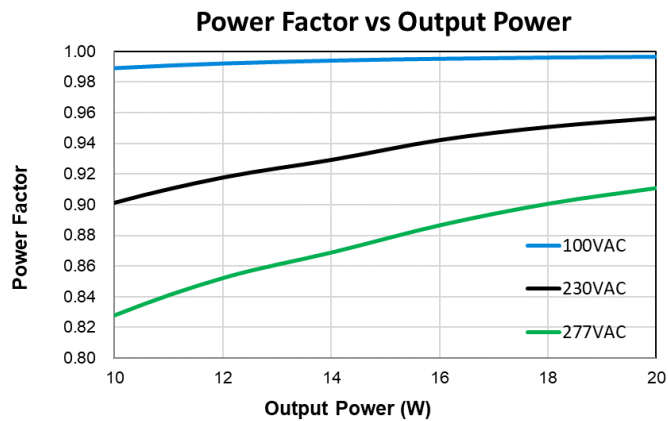


LED Driver

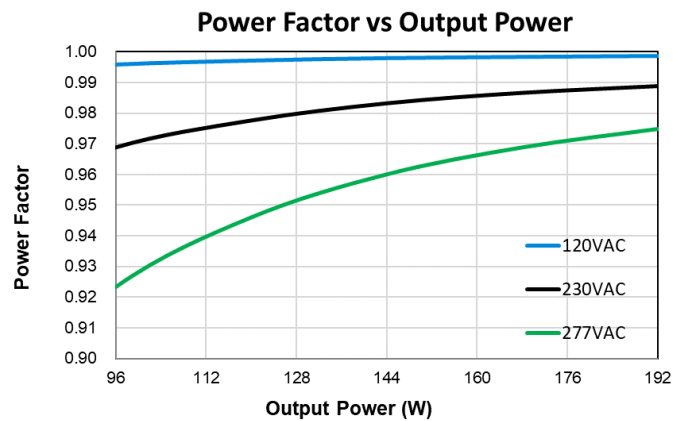
USVI S24 Series

Power Factor vs. Output Power

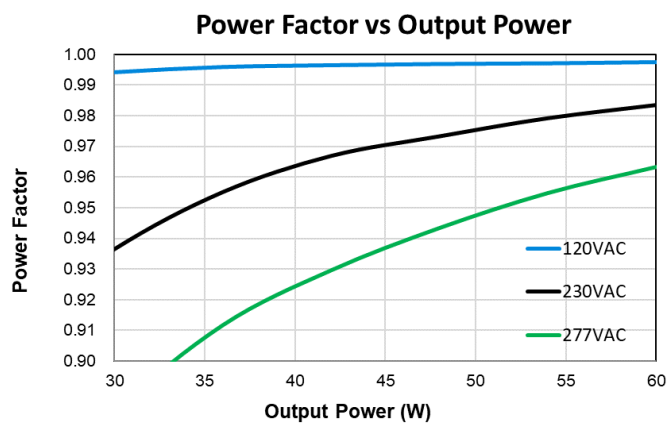
USVI-020024FA



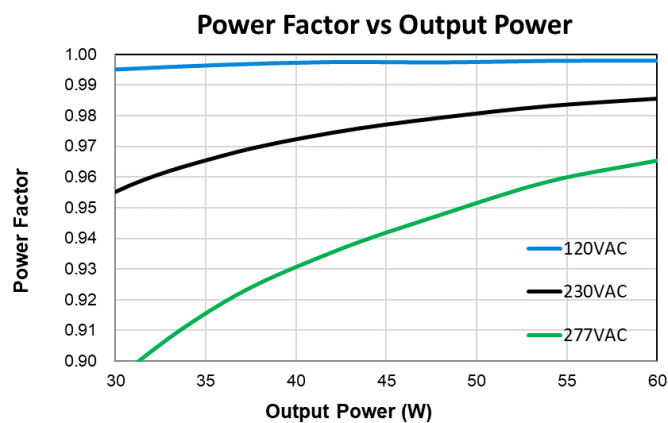
USVI-200024FA



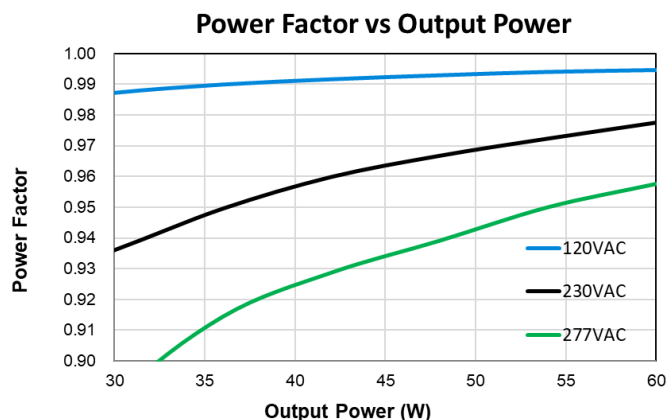
USVI-060024DG



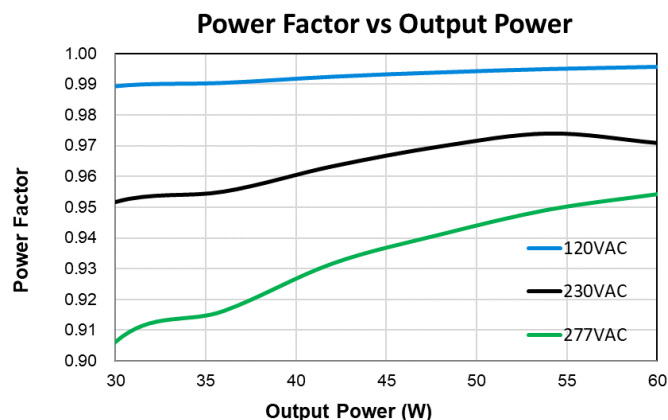
USVI-060024FG



USVI-100024DE / USVI-100024DG



USVI-100024FE / USVI-100024FG

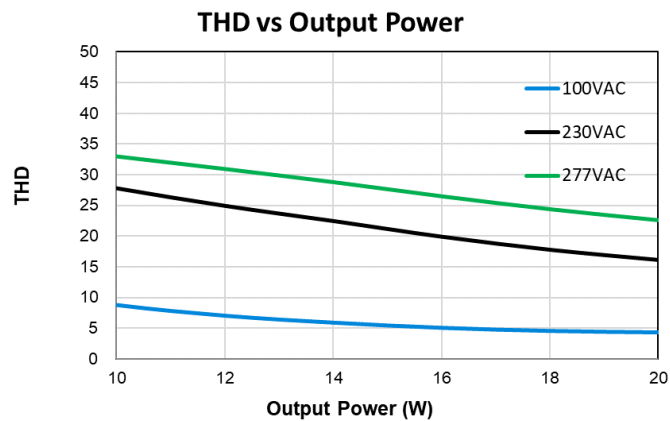


LED Driver

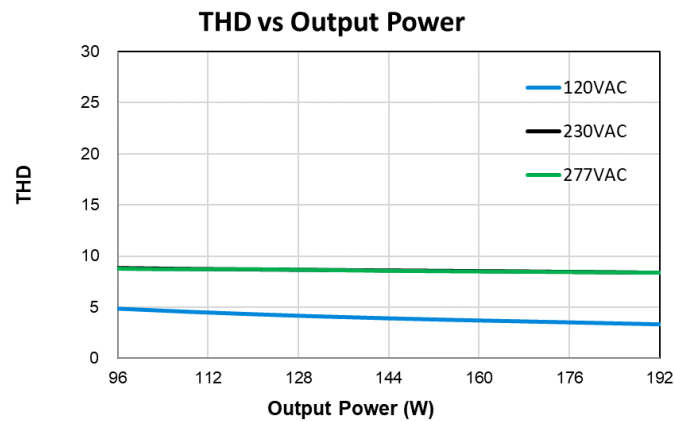
USVI S24 Series

Total Harmonic Distortion vs. Output Power

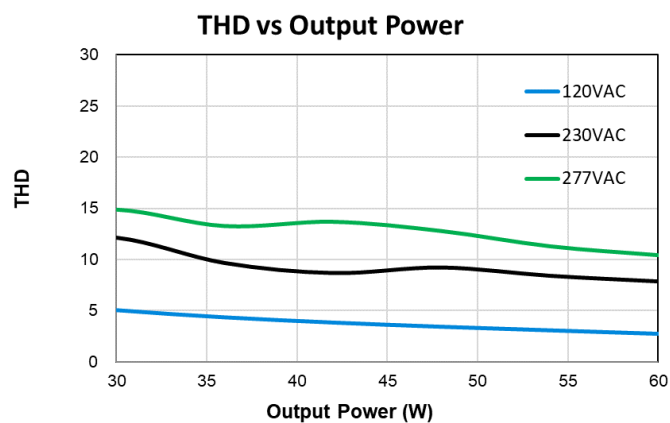
USVI-020024FA



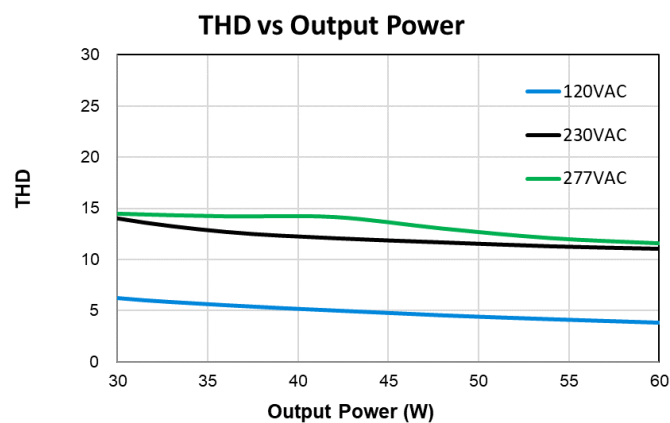
USVI-200024FA



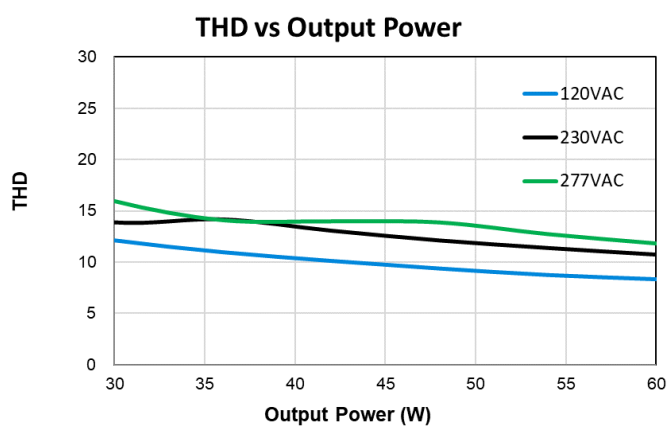
USVI-060024DG



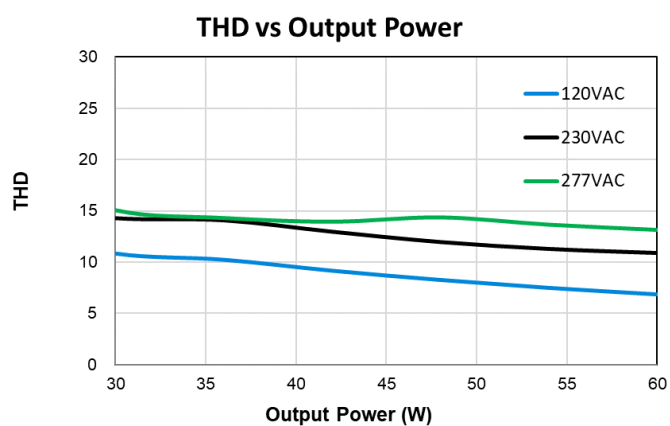
USVI-060024FG



USVI-100024DE / USVI-100024DG



USVI-100024FE / USVI-100024FG

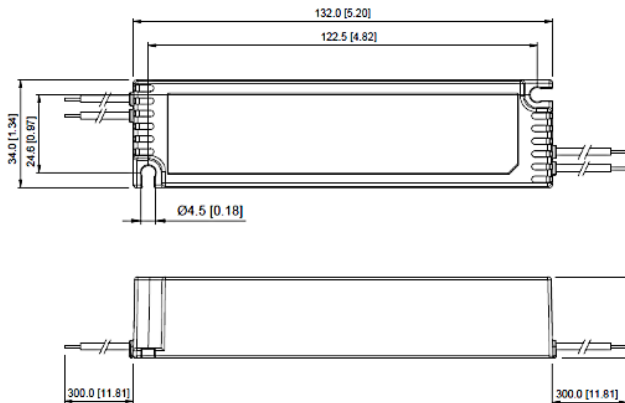


LED Driver

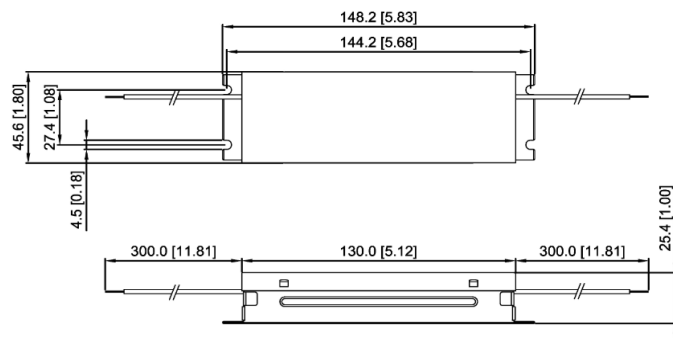
USVI S24 Series

Dimensions

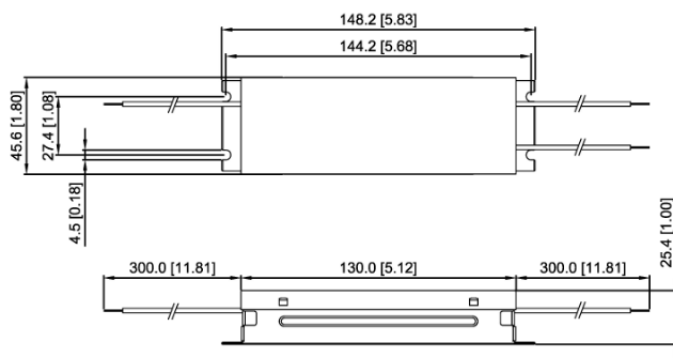
USVI-020024FA



USVI060024FG



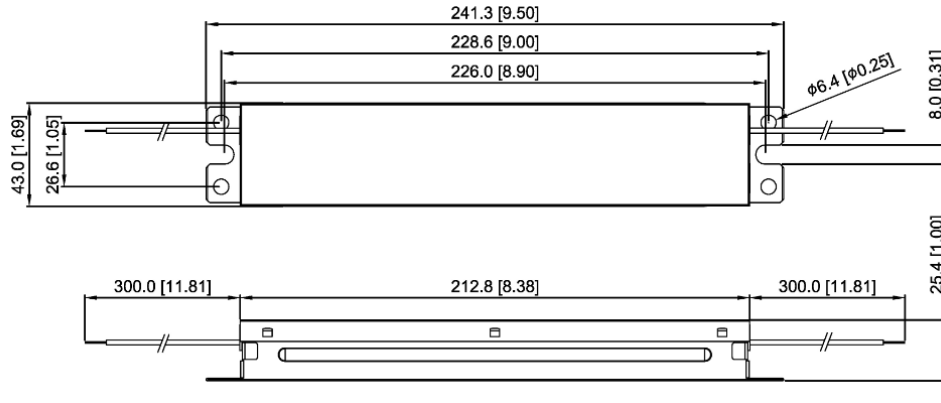
USVI060024DG



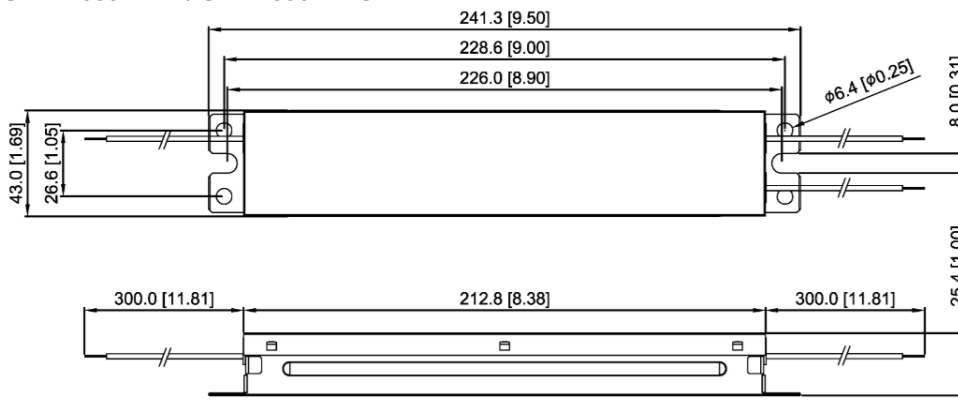
LED Driver

USVI S24 Series

USVI-100024FE / USVI100024FG



USVI-100024DE / USVI100024DG



USVI-200024FA

