TECHNICAL DATASHEET

LED Driver
USVI S24 Series

USVI 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

c UL us LISTED E336604 · c SP us 158114 · CE · SELV

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-060024FH	9.50 x 1.70 x 1.18 inch (241.3 x 43.1 x 30.0 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-100024FH	9.50 x 1.70 x 1.18 inch (241.3 x 43.1 x 30.0 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-060024FH			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-100024FH			4.00A, 4.00A/ 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

All parameters are specified at 25°C ambient for all products unless otherwise indicated.

LED Driver
USVI S24 Series

Specifications

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

Input Ratings / Characteristics

Normal Input Voltage		100-277Vac	120-277Vac	120-277Vac	120-277Vac
Input Voltage Range		90-305Vac	108-305Vac	108-305Vac	108-305Vac
Normal Input Frequency		50-60 Hz	50-60 Hz	50-60 Hz	50-60 Hz
Input Frequency Range		47-63 Hz	47-63 Hz	47-63 Hz	47-63 Hz
Input Current Max		0.27A	0.58A	0.58A	0.59A
Efficiency[1)]	277Vac	80.0% typ.	90.0% typ.	90.0% typ.	87.0% typ.
Inrush Current Peak >50% Duration		32A/ 150us	70A/ 250us	70A/ 250us	50A/ 250us
Power Factor @ max. Load.		> 0.9	> 0.95	> 0.95	> 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	0.10A – 2.50A	0.10A – 2.50A	0.10A – 2.50A
Max. Output Power (per channel)	20W	60W	60W	60W
Output Channel	1			
Max. Output Power (total output)	20W	60W	60W	60W
Output Voltage Tolerance	± 3%			
Line Regulation	± 1%			
Load Regulation	± 3%			
Output Ripple Voltage	< 720mVp-p	< 500mVp-p	< 500mVp-p	<400mVp-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	USVI-060024FH

Mechanical

Casing		Plastic, Color : White	Metal sheet, Color : White	Metal sheet, 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	5.83 x 1.80 x 1.00 148.2 x 45.6 x 25.4	9.50 x 1.70 x 1.18 241.3 x 43.1 x 30.0
Unit Weight	[lbs] [kg]	0.40 0.18	0.75 0.34	0.75 0.34	1.32 0.60
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	Positive: Red, Negative: Black, 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	-25°C to +55°C	-40°C to +55°C
	Storage	-40°C to +85°C			
Case Temperature (for UL)		+90°C	+90°C	+90°C	+85°C
Case Temperature (for warranty)		+70°C	+80°C	+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-020024FA*	USVI-060024DG	USVI-060024FG	USVI-060024FH

Safety Standards / Directives

Electrical Safety	cULus	UL 8750, Class P, type “HL”. Class 2 Output			
	CSA	N/A			CAN/CSA C22.2 No.250.13
	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 ±	Case
	Input	N/A	3000V	3000V	3000V
	Output	3000V	N/A	N/A	500V
	DIM ±	3000V	N/A	N/A	500V
	Case	3000V	500V	500V	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-060024FH

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

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

Emissions (CE & RE)	Compliance to EN 55015	
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 1.2/50μs, 8/20μs 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	$P_{st} \leq 1.0$; $d_{max} \leq 4\%$; $P_{lt} \leq 0.65$; $d_c \leq 3.3\%$; $T_{max} \leq 500ms$

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-100024FH	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				0.91A	1.83A
Efficiency[1)]	277Vac	89.5% typ.	89.5% typ.	89.5% typ.	89.5% typ.	90.0% typ.	90.5% typ.
Inrush Current Peak >50% Duration		150A/ 250us				70A / 200uS	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)	0.10A – 4.15A	0.10A – 4.00A	0.10A – 4.00A
Max. Output Power (per channel)	99.6W	96W	96W
Output Channel	1	1	2
Max. Output Power (total output)	99.6W	96W	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-100024FH	USVI-200024FA

Mechanical

Casing		Metal sheet, Color : White					
Dimensions (L x W x H)	[inch] [mm]	9.50 x 1.70 x 1.00 241.3 x 43.1 x 25.4				9.50 x 1.70 x 1.18 241.3 x 43.1 x 30.0	16.70 x 1.70 x 1.18 424.0 x 43.1 x 30.0
Unit Weight	[lbs] [kg]	1.08 0.49				1.32 0.60	2.6 1.18
Cooling System		Convection					
Input Wire		Line: Black, Neutral: White, Wire Length 300mm					
Output Wire		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: Blue, Wires Length 300mm	Positive: Red, Negative: Black, Wire 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	+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-100024FH	USVI-200024FA

Safety Standards / Directives

Electrical Safety	cULus	UL 8750, Class P, type “HL”. Class 2 Output			
	CSA	N/A		CAN/CSA C22.2 No.250.13	CAN/CSA C22.2 No.250.13
	CE	IEC 61347-1, IEC 61347-2-13, SELV Output	N/A	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	3000V	3000V	3000V
	Output	3000V	N/A	N/A	500V
	DIM ±	3000V	N/A	N/A	500V
	Case	3000V	500V	500V	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

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-100024FH / USVI-200024FA

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

EMC

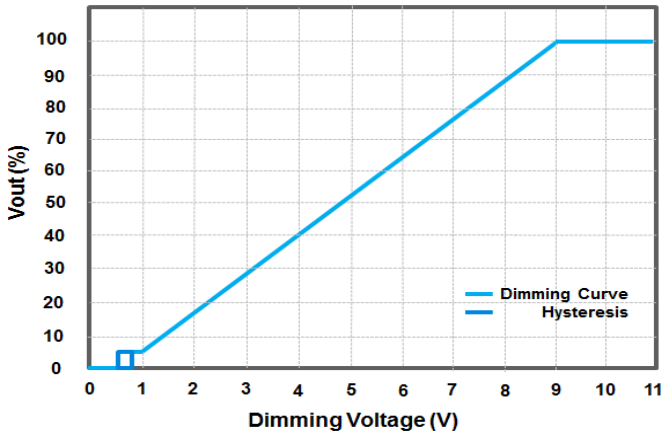
USVI-100024DG / USVI-100024FG / USVI-100024FH

Emissions (CE & RE)	Compliance to EN 55015	
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 1.2/50μs, 8/20μs 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	$P_{st} \leq 1.0$; $d_{max} \leq 4\%$; $P_{lt} \leq 0.65$; $d_c \leq 3.3\%$; $T_{max} \leq 500ms$

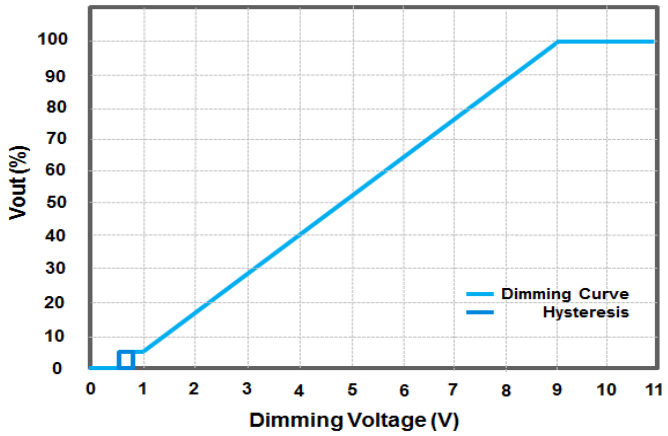
1) Criteria A: Normal performance within the specification limits
2) Criteria B: Temporary degradation or loss of function, which is self-recoverable
3) Asymmetrical: Common mode (Line to earth)
4) Symmetrical: Differential mode (Line to line)

Dimming Curve – dimming voltage vs. output voltage

USVI-060024DG



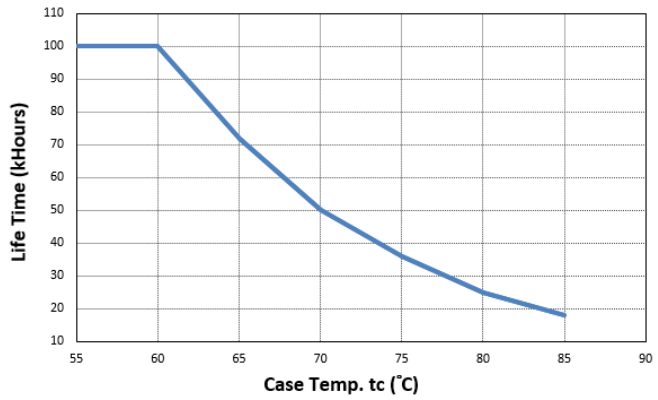
USVI-100024DE/ USVI-100024DG



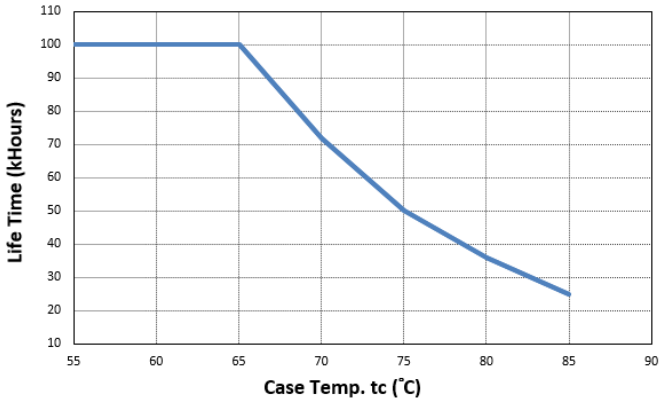
LED Driver
USVI S24 Series

Driver Lifetime vs. Case Temperature

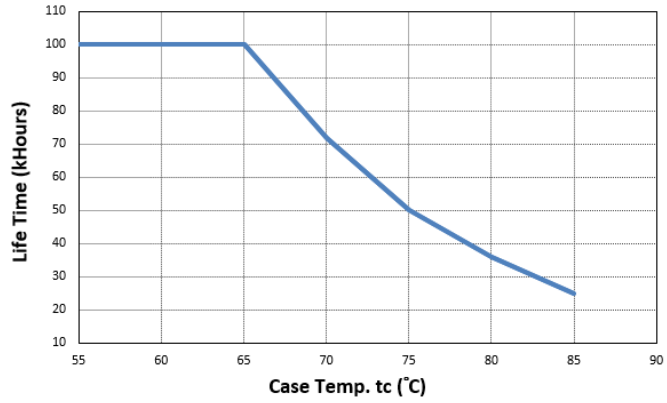
USVI-020024FA



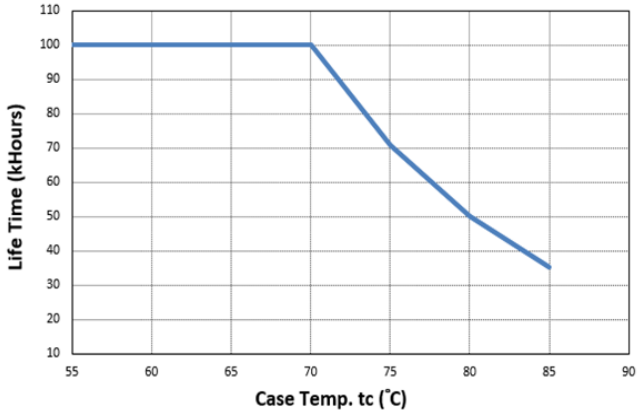
USVI-200024FA



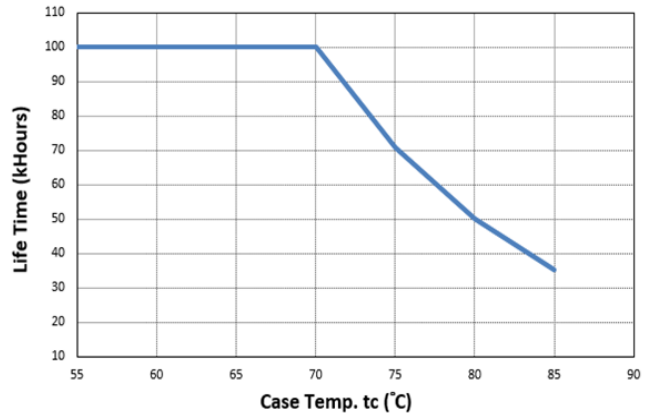
USVI-060024DG/ USVI-060024FG



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



USVI-100024FH



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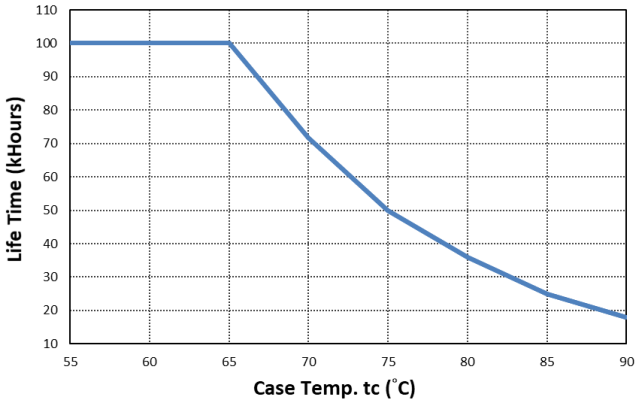

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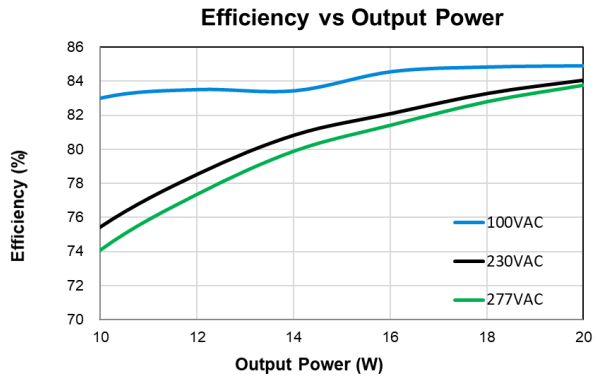
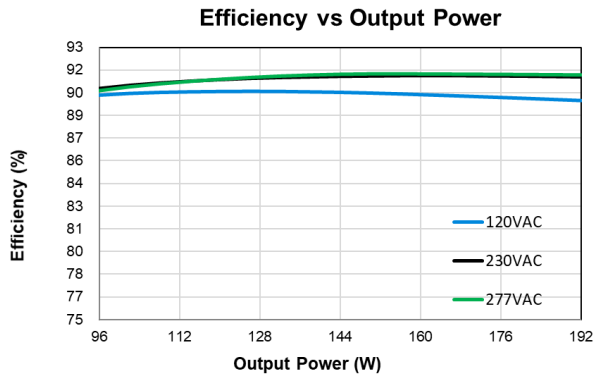
LED Driver
USVI S24 Series

Efficiency vs. Output Power

USVI-020024FA



USVI-200024FA



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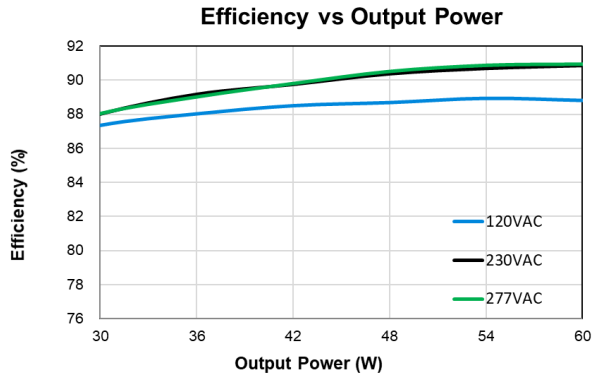

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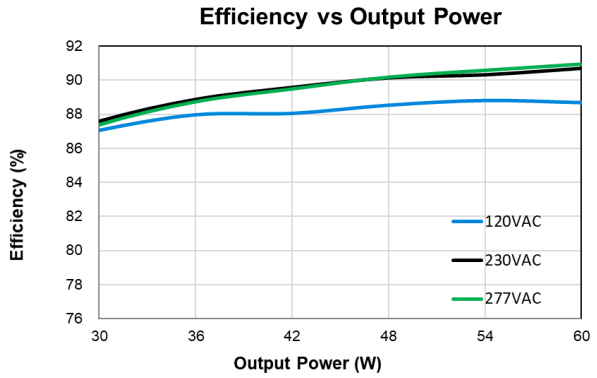
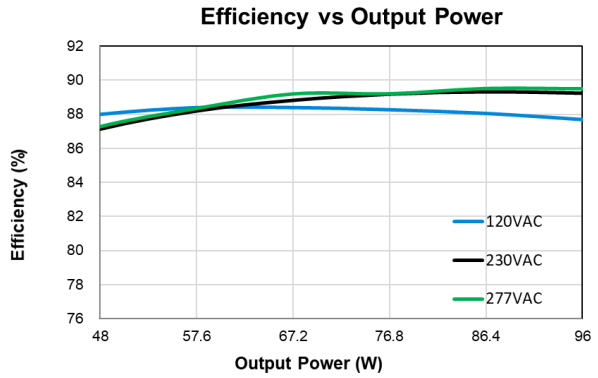
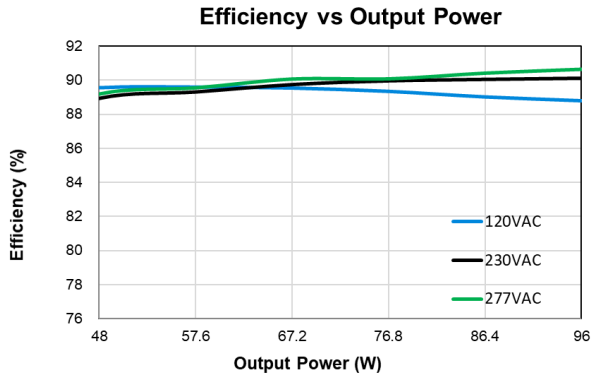


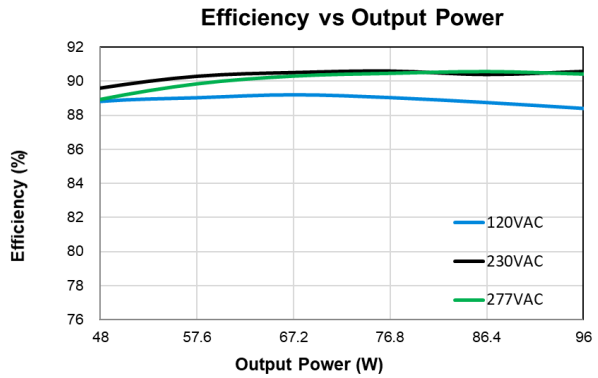
USVI-100024DE / USVI-100024DG



USVI-100024FE / USVI-100024FG



USVI-100024FH



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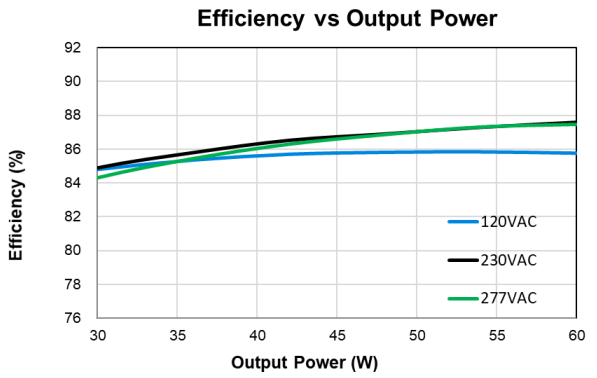
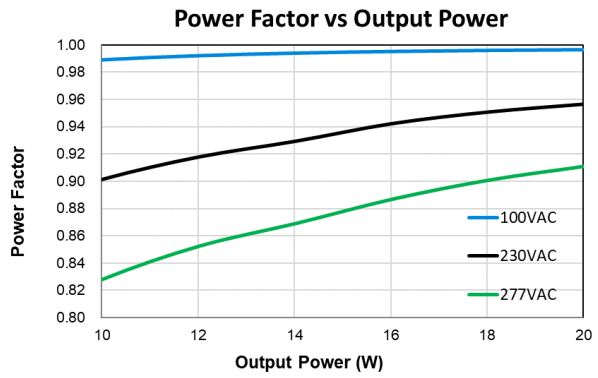


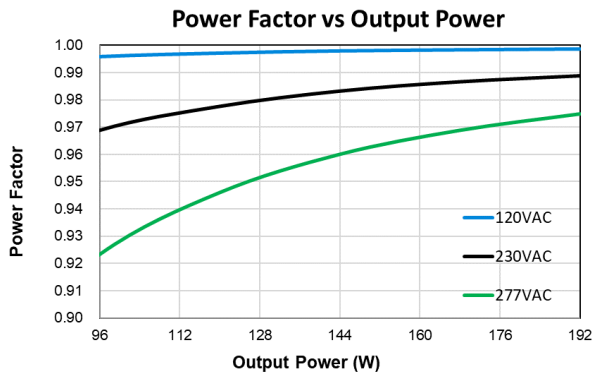
LED Driver
USVI S24 Series

Power Factor vs. Output Power

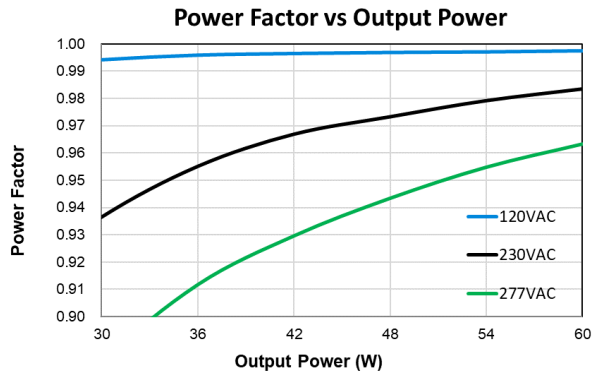
USVI-020024FA



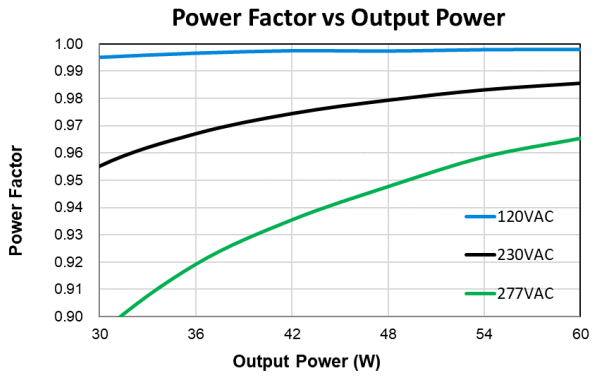
USVI-200024FA



USVI-060024DG



USVI-060024FG



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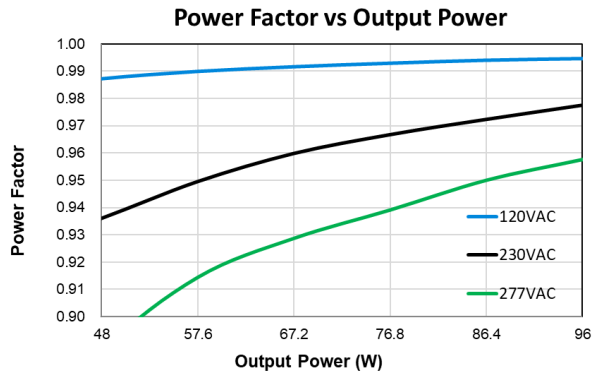

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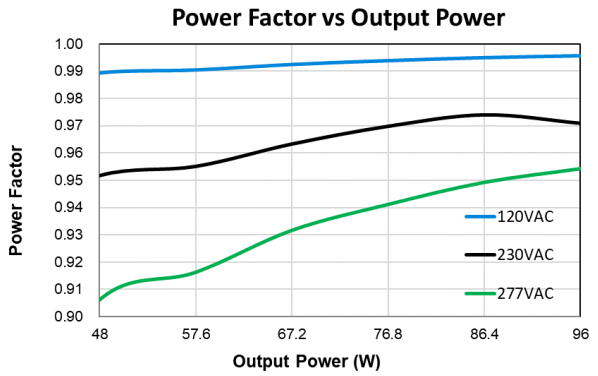

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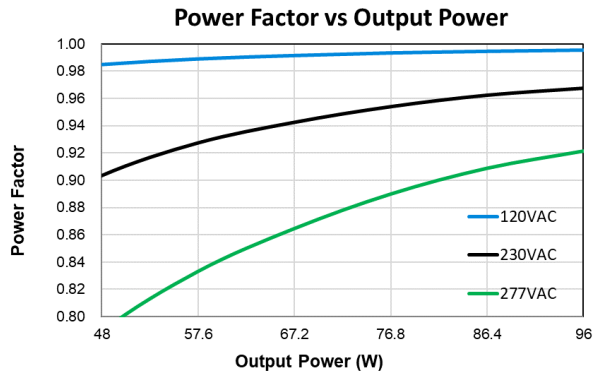

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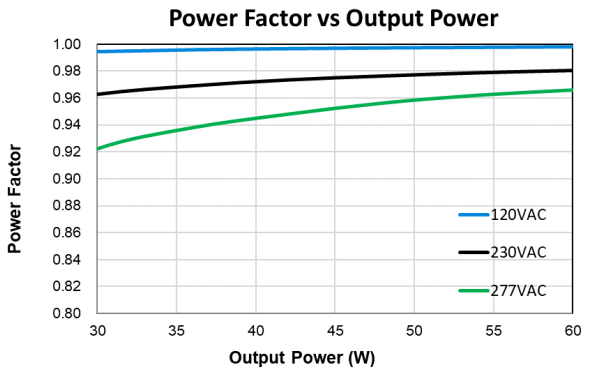

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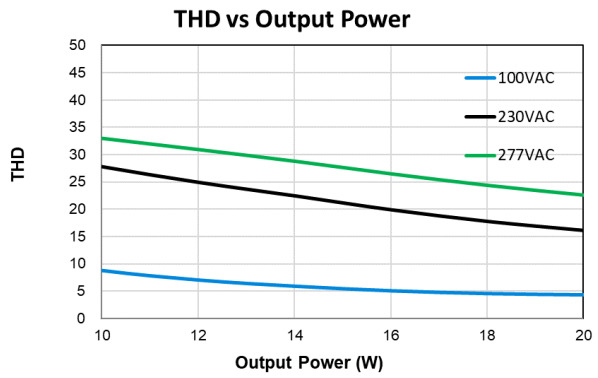
LED Driver
USVI S24 Series

Total Harmonic Distortion vs. Output Power

USVI-020024FA



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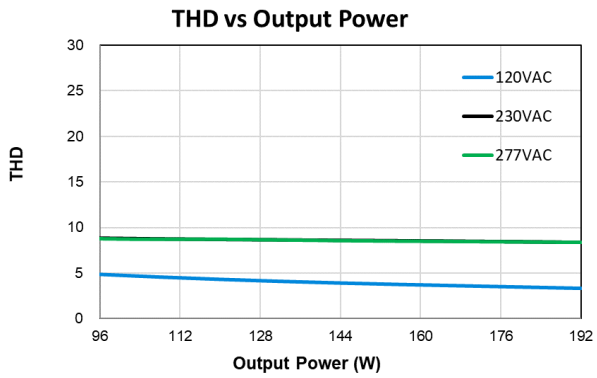

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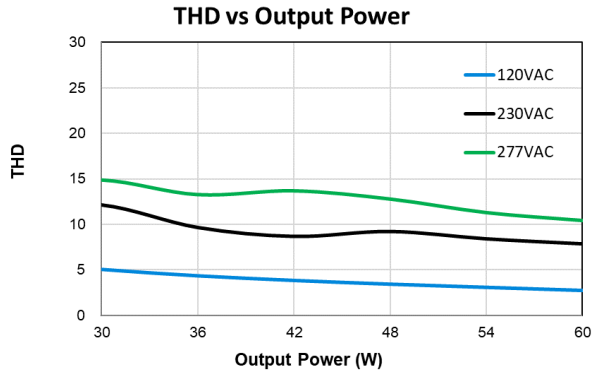

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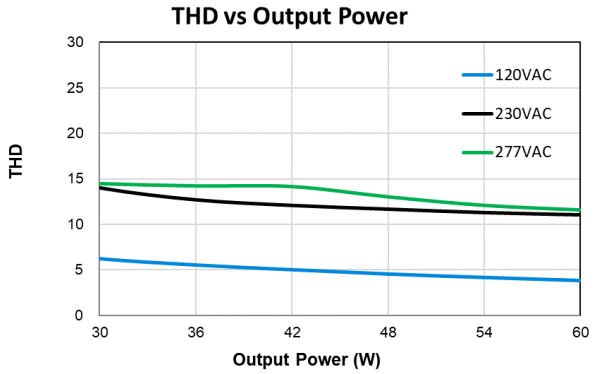
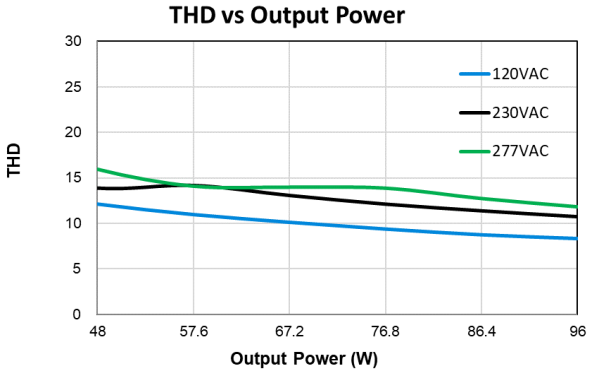


USVI-100024DE / USVI-100024DG



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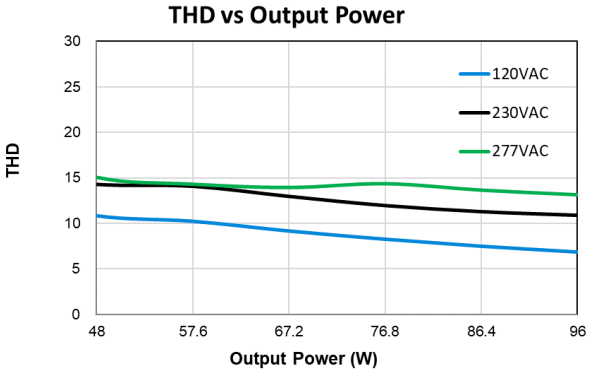

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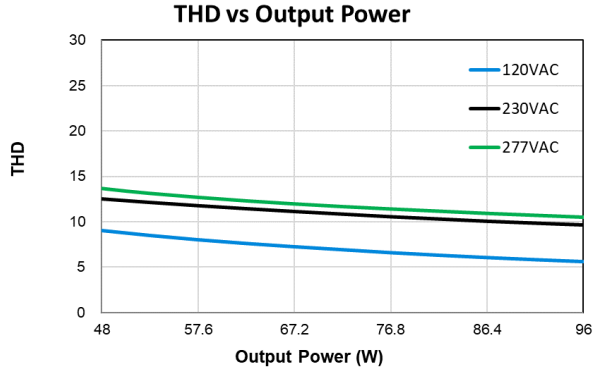

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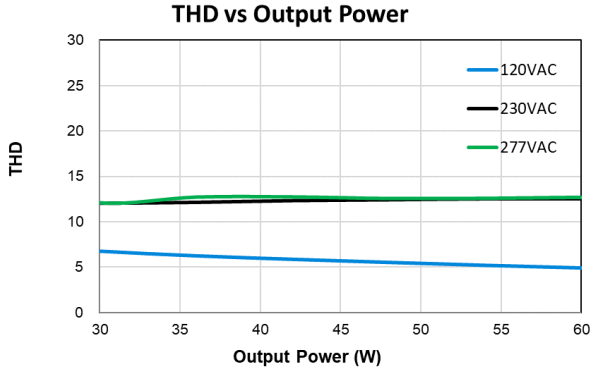
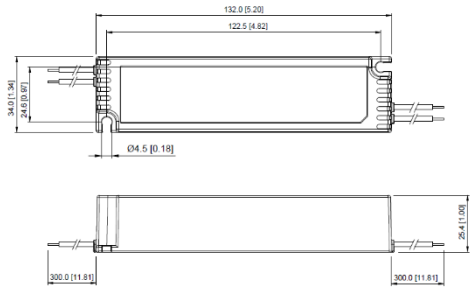


LED Driver
USVI S24 Series

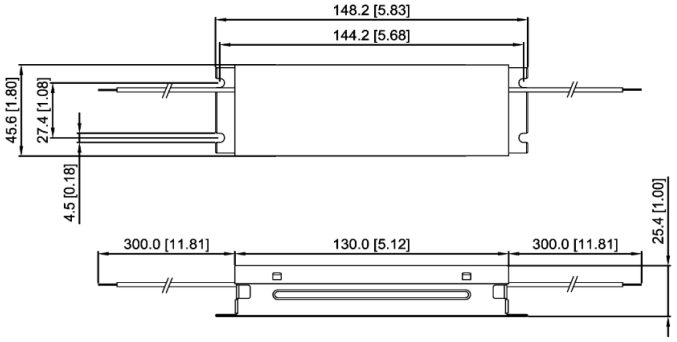
Dimensions

USVI-020024FA



Unit:mm

USVI060024FG



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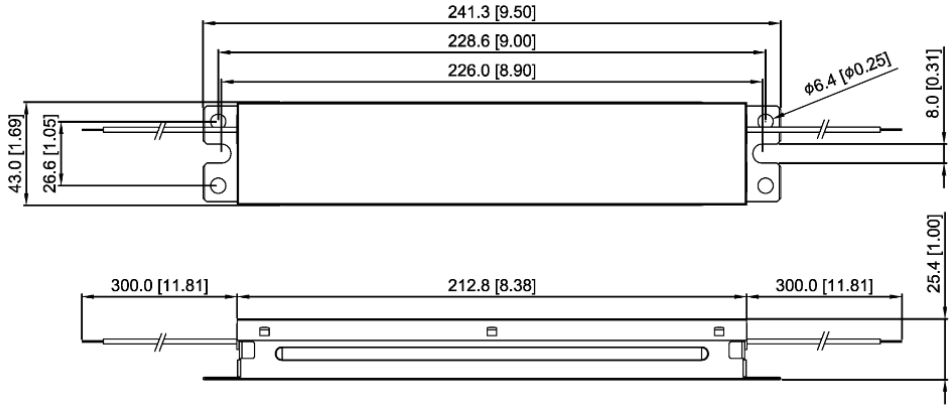
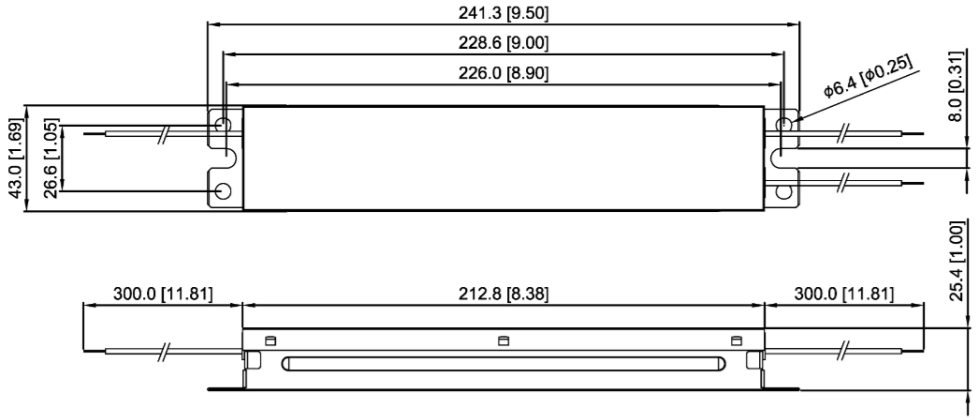
USVI-100024FE / USVI100024FG



Unit:mm

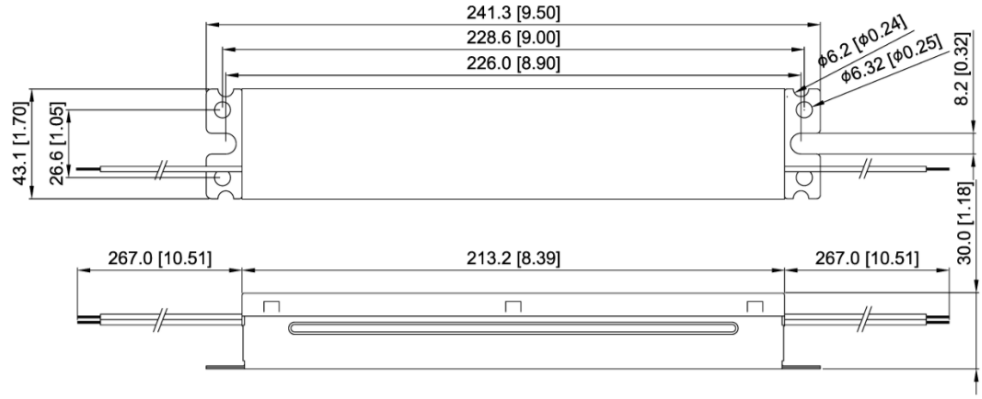
LED Driver
USVI S24 Series

USVI-100024DE / USVI100024DG



Unit:mm

USVI-060024FH / USVI-100024FH



Unit:mm

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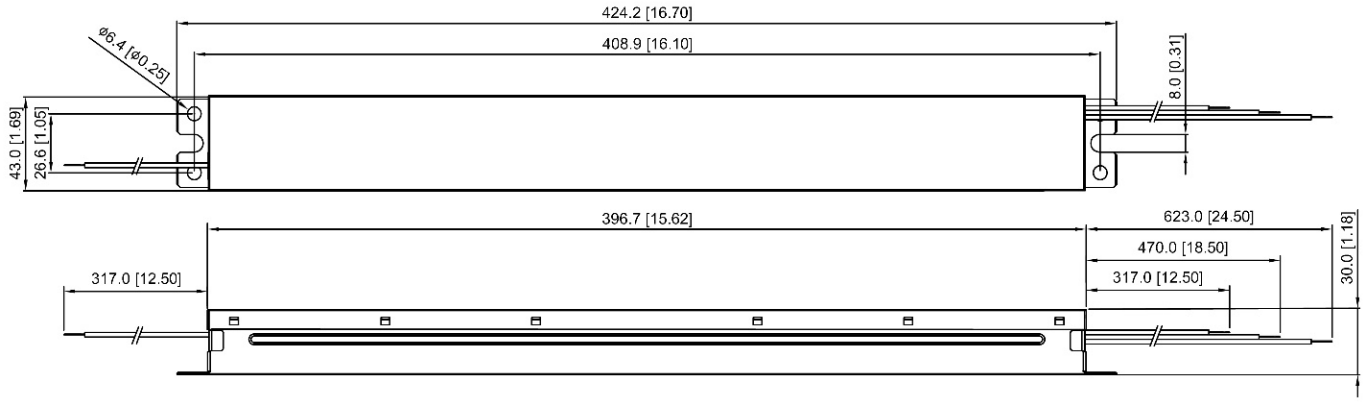

Unit:mm

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