

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



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 |

LED Driver

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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 |
|----------------|---|

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| 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 | $P_{st} \leq 1.0$; $d_{max} \leq 4\%$; $P_{It} \leq 0.65$; $d_c \leq 3.3\%$; $T_{max} \leq 500ms$ |

1) Criteria A: Normal performance within the specification limits

3) Asymmetrical: Common mode (Line to earth)

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

4) Symmetrical: Differential mode (Line to line)

LED Driver

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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

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| 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: Red/White, Wire Length 12.5inch (317mm) Positive: Blue, Negative: Blue/White, Wires Length 18.5inch (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 |

LED Driver

USVI S24 Series

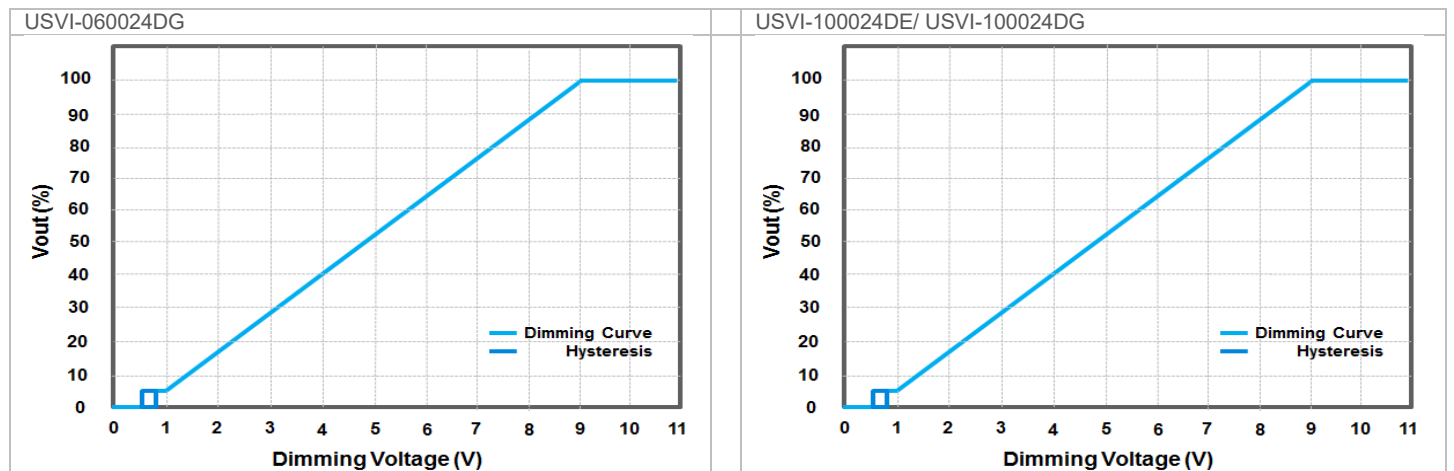
EMC

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 | $P_{st} \leq 1.0$; $d_{max} \leq 4\%$; $P_{It} \leq 0.65$; $d_c \leq 3.3\%$; $T_{max} \leq 500ms$ |

- 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)

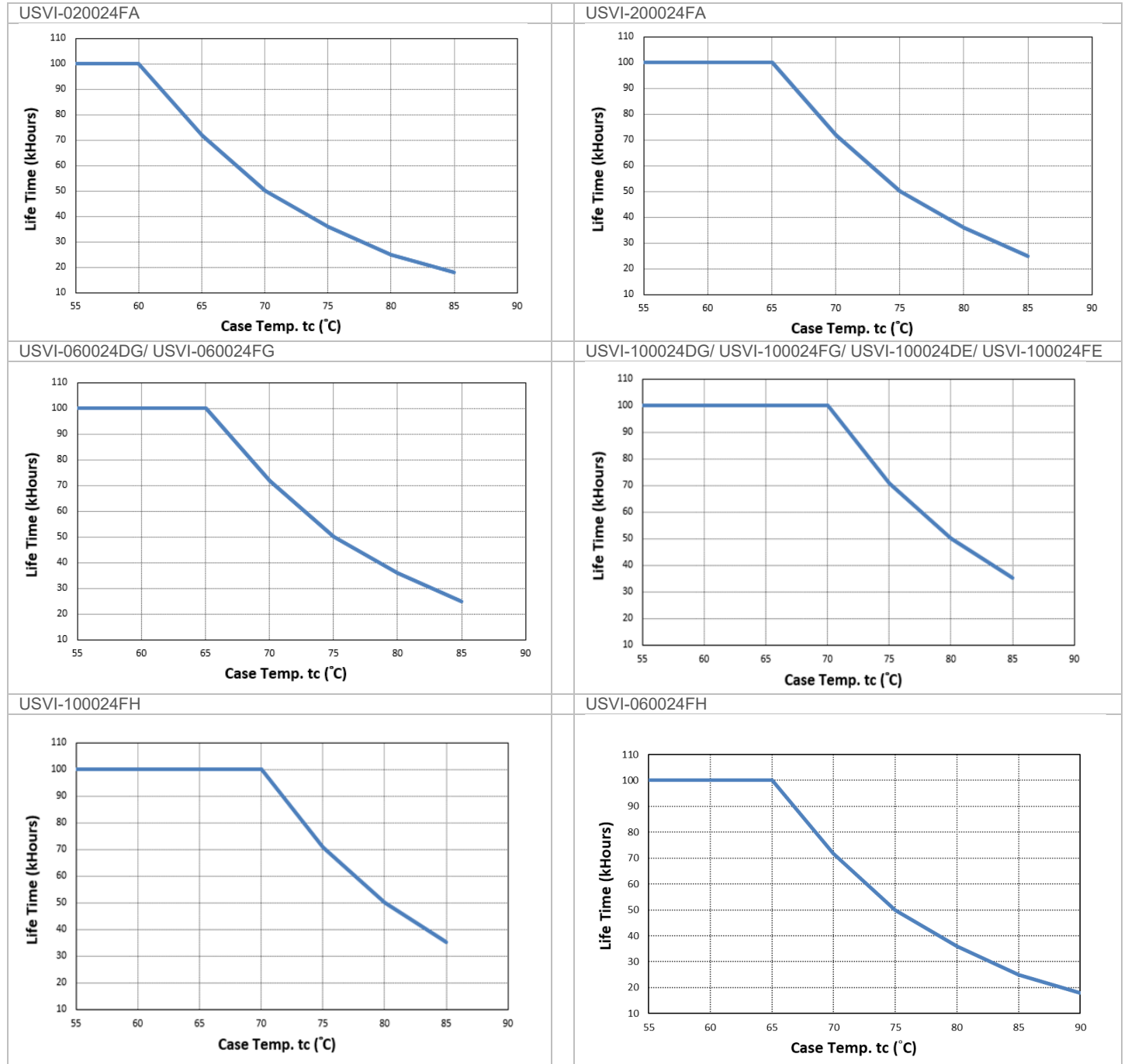
Dimming Curve – dimming voltage vs. output voltage



LED Driver

USVI S24 Series

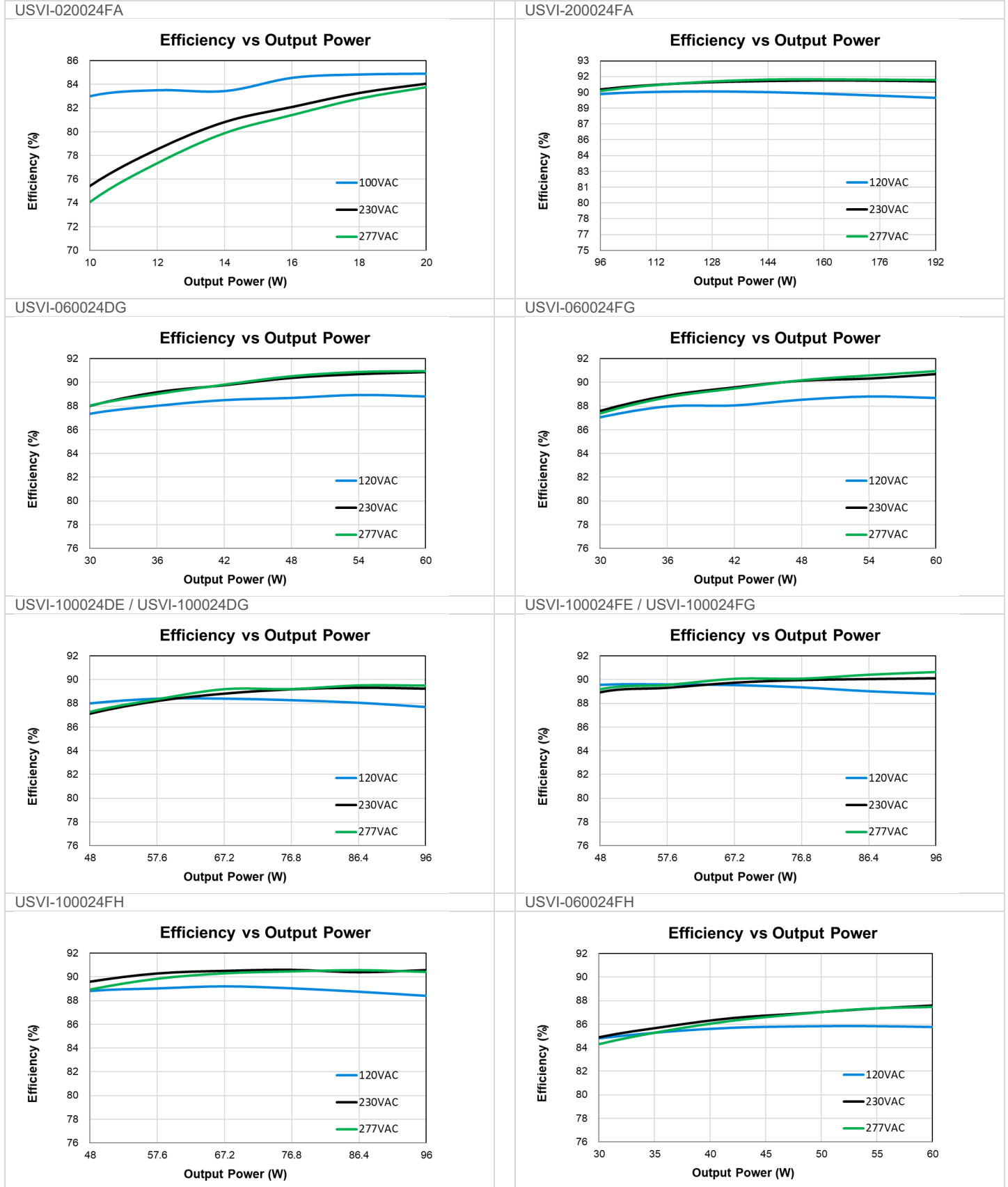
Driver Lifetime vs. Case Temperature



LED Driver

USVI S24 Series

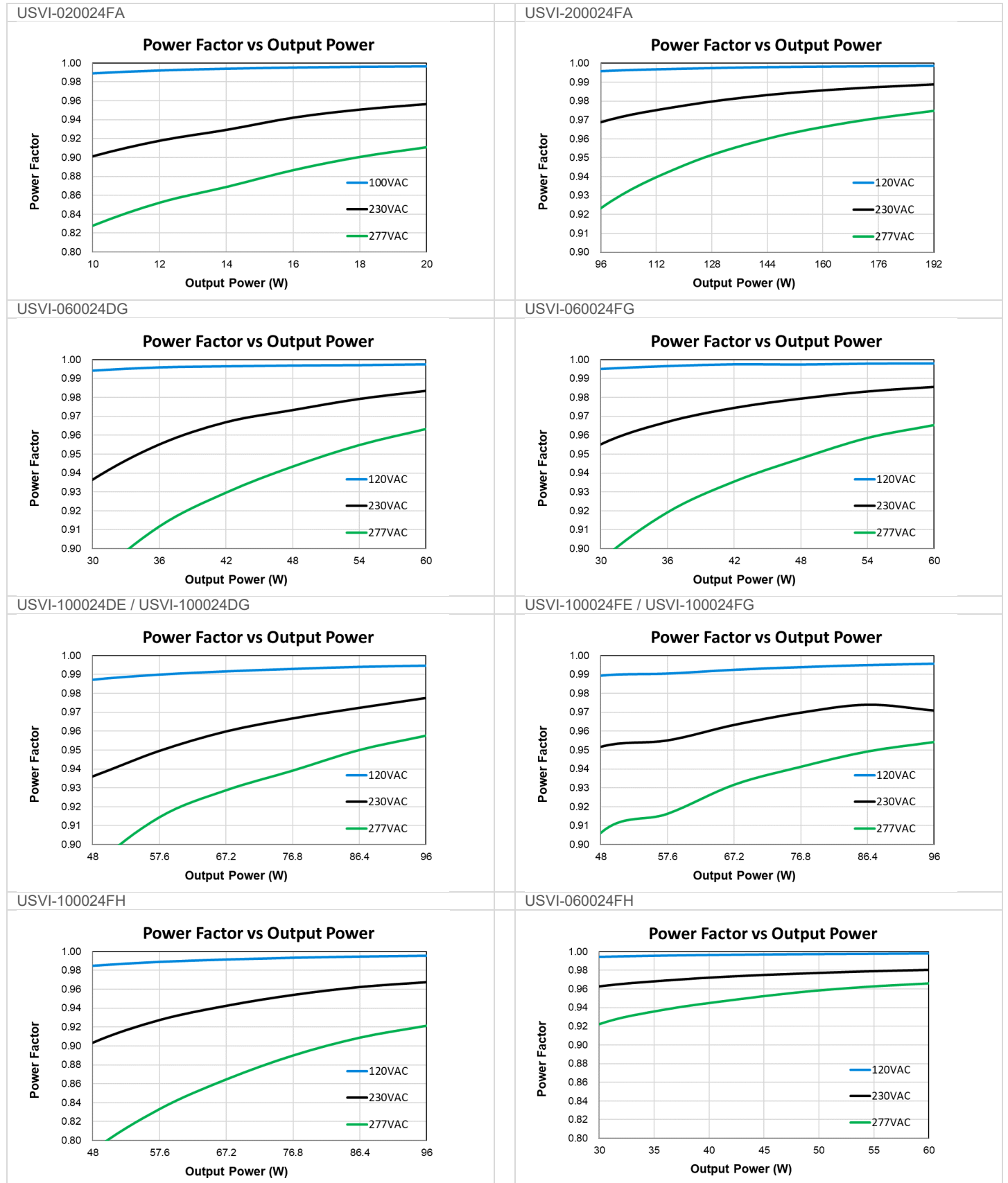
Efficiency vs. Output Power



LED Driver

USVI S24 Series

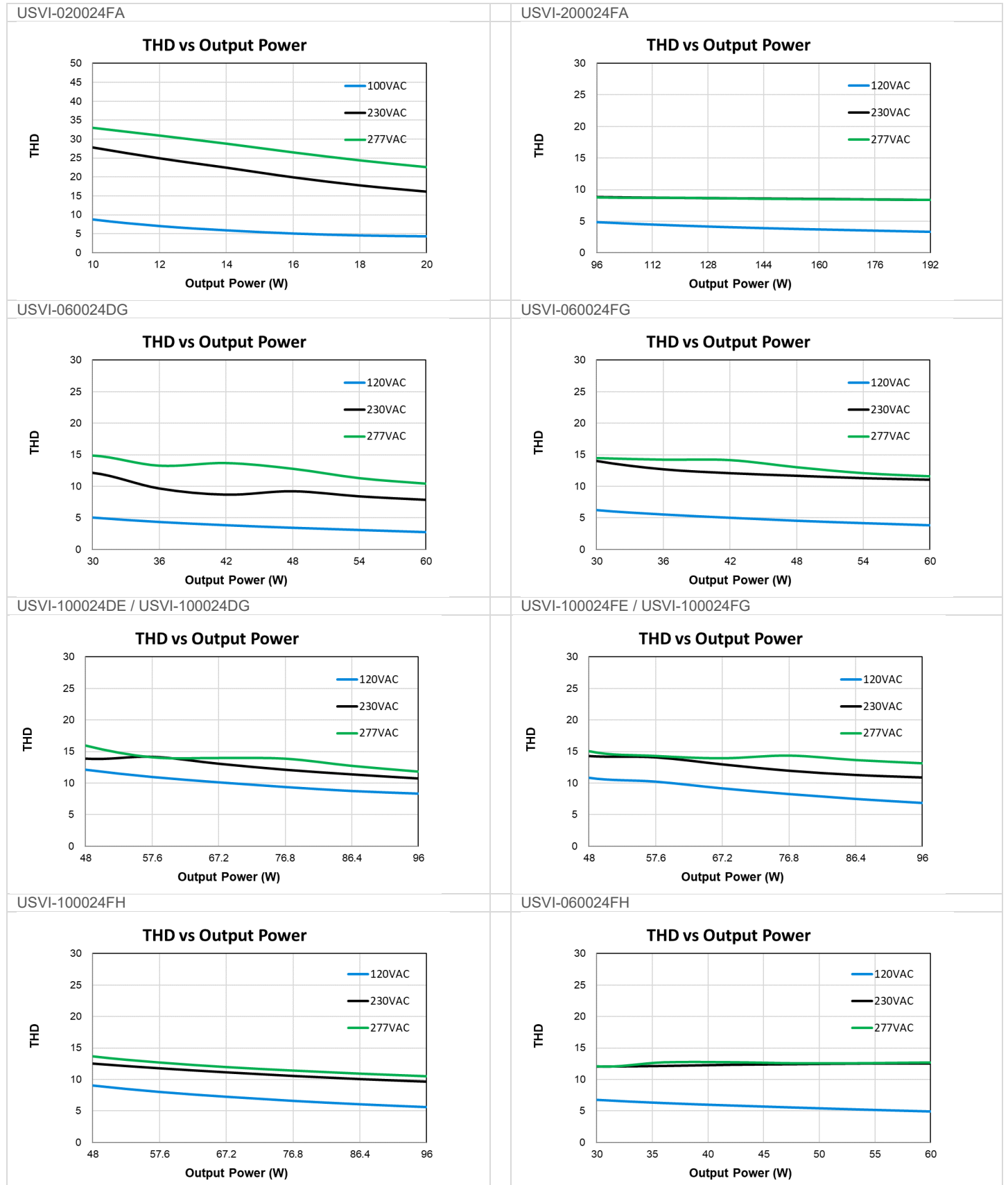
Power Factor vs. Output Power



LED Driver

USVI S24 Series

Total Harmonic Distortion vs. Output Power

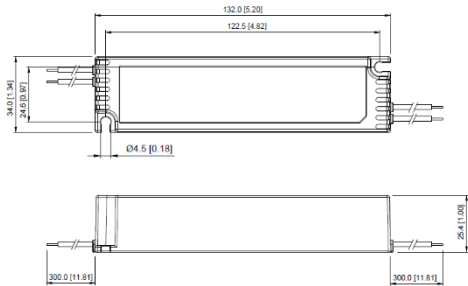


LED Driver

USVI S24 Series

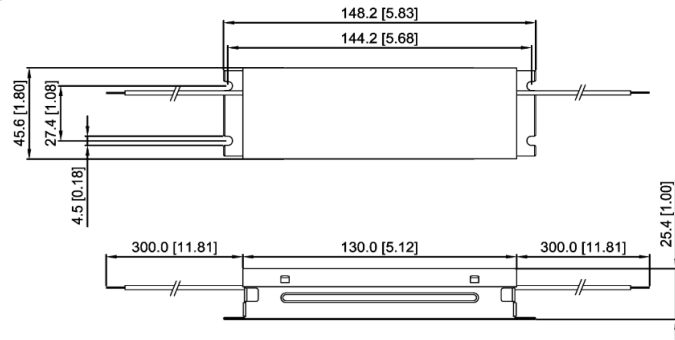
Dimensions

USVI-020024FA



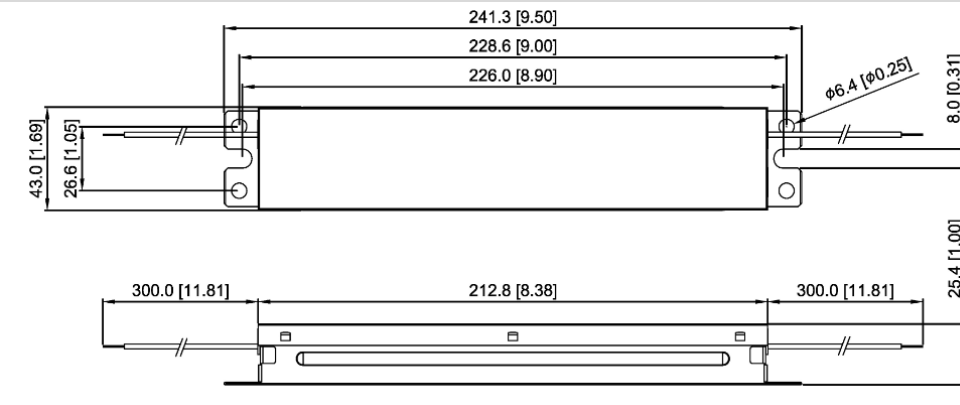
Unit:mm

USVI060024FG



Unit:mm

USVI-100024FE / USVI100024FG



Unit:mm