PRODUCT DESCRIPTION

Advanced Energy’s Artesyn ASA 6W-M series are single and dual output DC/DC converter modules. The ASA 6W-M series DC/DC converters offer an economical solution for demanding applications in industrial and medical instrumentation requesting a certified high supplementary or reinforced insulation system to comply with relative industrial or medical safety standards. All models feature ultra-wide 2:1 input range with excellent output voltage regulation. The ASA 6W-M series can deliver up to 6W output power from the single or dual output module with high 80% typical efficiency and excellent thermal performance over an operating ambient temperature range of -40 °C ~ +75 °C.

SPECIAL FEATURES

- 4000 Vac reinforced insulation
- Medical safety to UL/cUL/EN/IEC 60601-1 3rd Edition
- 2 MOOP rated
- Wide 2:1 input voltage range
- Fully regulated output voltage
- Low leakage current
- Operating temperature range -40 °C to +75 °C (with derating)
- Input filter meets EN 55022, class A and FCC, level A
- Overload protection
- 1.25” x 0.8” package
- RoHS compliant
- Three-year product warranty

SAFETY

- cUL/UL62368-1, CSA C22.2 No. 62368-1-03
- UL60601-1, CSA C22.2 No.601-1
- cUL/UL62368-1 certificate
- UL60601-1 UL certificate

TYPICAL APPLICATIONS

- Industrial
- Medical

TECHNICAL REFERENCE NOTE

Total Power:
6 Watts

Input Voltage:
9-18 Vdc
18-36 Vdc
36-75 Vdc

# of Outputs:
Single / Dual
## Model Numbers

<table>
<thead>
<tr>
<th>Model</th>
<th>Input Voltage</th>
<th>Output Voltage</th>
<th>Maximum Load</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASA01A12-M</td>
<td>9-18Vdc</td>
<td>5V</td>
<td>1A</td>
<td>75%</td>
</tr>
<tr>
<td>ASA001B12-M</td>
<td>9-18Vdc</td>
<td>12V</td>
<td>0.5A</td>
<td>78%</td>
</tr>
<tr>
<td>ASA01BB12-M</td>
<td>9-18Vdc</td>
<td>±12V</td>
<td>±0.25A</td>
<td>78%</td>
</tr>
<tr>
<td>ASA01CC12-M</td>
<td>9-18Vdc</td>
<td>±15V</td>
<td>±0.2A</td>
<td>78%</td>
</tr>
<tr>
<td>ASA01A24-M</td>
<td>18-36Vdc</td>
<td>5V</td>
<td>1A</td>
<td>77%</td>
</tr>
<tr>
<td>ASA01B24-M</td>
<td>18-36Vdc</td>
<td>12V</td>
<td>0.5A</td>
<td>80%</td>
</tr>
<tr>
<td>ASA01BB24-M</td>
<td>18-36Vdc</td>
<td>±12V</td>
<td>±0.25A</td>
<td>80%</td>
</tr>
<tr>
<td>ASA01CC24-M</td>
<td>18-36Vdc</td>
<td>±15V</td>
<td>±0.2A</td>
<td>80%</td>
</tr>
<tr>
<td>ASA01A48-M</td>
<td>36-75 Vdc</td>
<td>5V</td>
<td>1A</td>
<td>77%</td>
</tr>
<tr>
<td>ASA01B48-M</td>
<td>36-75 Vdc</td>
<td>12V</td>
<td>0.5A</td>
<td>80%</td>
</tr>
<tr>
<td>ASA01BB48-M</td>
<td>36-75 Vdc</td>
<td>±12V</td>
<td>±0.25A</td>
<td>80%</td>
</tr>
<tr>
<td>ASA01CC48-M</td>
<td>36-75 Vdc</td>
<td>±15V</td>
<td>±0.2A</td>
<td>80%</td>
</tr>
</tbody>
</table>
Absolute Maximum Ratings

Stress in excess of those listed in the “Absolute Maximum Ratings” may cause permanent damage to the power supply. These are stress ratings only and functional operation of the unit is not implied at these or any other conditions above those given in the operational sections of this TRN. Exposure to any absolute maximum rated condition for extended periods may adversely affect the power supply’s reliability.

### Table 1. Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Model</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>Operating - Continuous</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12V input Models</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24V input Models</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>48V input Models</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>V_{in,dc}</strong></td>
<td><strong>9</strong></td>
<td><strong>18</strong></td>
<td>-</td>
<td>-</td>
<td>Vdc</td>
</tr>
<tr>
<td>Maximum Output Power</td>
<td>All models</td>
<td><strong>P_{o,max}</strong></td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>W</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>Input to output</td>
<td>All models</td>
<td>4000</td>
<td>-</td>
<td>-</td>
<td>Vac</td>
</tr>
<tr>
<td>Isolation Resistance</td>
<td>500Vdc</td>
<td>All models</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>Gohm</td>
</tr>
<tr>
<td>Isolation Capacitance</td>
<td>100KHz, 1V</td>
<td>All models</td>
<td>-</td>
<td>7</td>
<td>13</td>
<td>pF</td>
</tr>
<tr>
<td>Operating Ambient Temperature</td>
<td>All models</td>
<td><strong>T_{a}</strong></td>
<td>-40</td>
<td>-</td>
<td>+75</td>
<td>°C</td>
</tr>
<tr>
<td>With Derating</td>
<td>All models</td>
<td></td>
<td>-40</td>
<td>-</td>
<td>+55</td>
<td>°C</td>
</tr>
<tr>
<td>Without Derating</td>
<td>All models</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Case Temperature</td>
<td>All models</td>
<td><strong>T_{case}</strong></td>
<td>-40</td>
<td>-</td>
<td>+95</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>All models</td>
<td><strong>T_{stg}</strong></td>
<td>-50</td>
<td>-</td>
<td>+125</td>
<td>°C</td>
</tr>
<tr>
<td>Humidity (non-condensing)</td>
<td>Operating</td>
<td>All models</td>
<td>-</td>
<td>-</td>
<td>95</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Non-operating</td>
<td>All models</td>
<td>-</td>
<td>-</td>
<td>95</td>
<td>%</td>
</tr>
</tbody>
</table>
# Electrical Specifications

## Input Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Input Voltage, DC</td>
<td>12V input Models 24V input Models 48V input Models</td>
<td>$V_{\text{IN,DC}}$</td>
<td>9</td>
<td>18</td>
<td>36</td>
<td>Vdc</td>
</tr>
<tr>
<td>Input Surge Voltage</td>
<td>12V input Models 24V input Models 48V input Models</td>
<td>$V_{\text{IN,SURGE}}$</td>
<td>-0.7</td>
<td>-0.7</td>
<td>-0.7</td>
<td>Vdc</td>
</tr>
<tr>
<td>Start-up Threshold Voltage</td>
<td>12V input Models 24V Input Models 48V Input Models</td>
<td>$V_{\text{IN,ON}}$</td>
<td>7</td>
<td>13</td>
<td>30</td>
<td>Vdc</td>
</tr>
<tr>
<td>Under Voltage Shutdown</td>
<td>12V input Models 24V Input Models 48V Input Models</td>
<td>$V_{\text{IN,OFF}}$</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Vdc</td>
</tr>
<tr>
<td>Input reflected ripple current</td>
<td>12V input Models 24V Input Models 48V Input Models</td>
<td>$I_{\text{IN,ripple}}$</td>
<td>-</td>
<td>-</td>
<td>60</td>
<td>mA</td>
</tr>
</tbody>
</table>

| Input Current                      | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M | $V_{\text{IN,DC}}, V_{\text{IN,nom}}$ | $I_{\text{IN,full load}}$ | - | 570 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
|                                   | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M |                                |                                | - | 641 | mA |
| No Load Input Current (V<sub>0</sub>=On, b<sub>2</sub>=0A) | ASA01A12-M ASA001B12-M ASA01BB12-M ASA01CC12-M ASA01A24-M ASA01B24-M ASA01BB24-M ASA01CC24-M ASA01A48-M ASA01BB48-M ASA01CC48-M | $V_{\text{IN,DC}}, V_{\text{IN,nom}}$ | $I_{\text{IN,no-load}}$ | - | 30  | mA  |
## Electrical Specifications

### Input Specifications

<table>
<thead>
<tr>
<th>Table 2. Input Specifications con't</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
</tr>
<tr>
<td>Efficiency</td>
</tr>
<tr>
<td>Efficiency</td>
</tr>
<tr>
<td>Efficiency</td>
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<tr>
<td>Efficiency</td>
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<tr>
<td>Efficiency</td>
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<tr>
<td>MTBF</td>
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## Table 3. Output Specifications

<table>
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<tr>
<th>Parameter</th>
<th>Condition</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
</table>
| Output Voltage Set-Point | ASA01A12-M, ASA001B12-M, ASA01BB12-M, ASA01CC12-M, ASA01A24-M, ASA01B24-M, ASA01BB24-M, ASA01CC24-M, ASA01A48-M, ASA01B48-M, ASA01BB48-M, ASA01CC48-M | Vdc | 4.95 | 5 | 5.05 | V
| | | | 11.88 | 12 | 12.12 | V
| | | | ±11.88 | ±12 | ±12.12 | V
| | | | ±14.85 | ±15 | ±15.15 | V
| | | | 4.95 | 5 | 5.05 | V
| | | | 11.88 | 12 | 12.12 | V
| | | | ±11.88 | ±12 | ±12.12 | V
| | | | ±14.85 | ±15 | ±15.15 | V
| Output Current | ASA01A12-M, ASA001B12-M, ASA01BB12-M, ASA01CC12-M, ASA01A24-M, ASA01B24-M, ASA01BB24-M, ASA01CC24-M, ASA01A48-M, ASA01B48-M, ASA01BB48-M, ASA01CC48-M | Io | - | - | 1 | A
| | | | - | - | 0.5 | A
| | | | - | - | 0.25 | A
| | | | - | - | 0.2 | A
| V<sub>0</sub> Load Capacitance | ASA01A12-M, ASA001B12-M, ASA01BB12-M, ASA01CC12-M, ASA01A24-M, ASA01B24-M, ASA01BB24-M, ASA01CC24-M, ASA01A48-M, ASA01B48-M, ASA01BB48-M, ASA01CC48-M | All | - | - | 1000 | uF
| | | | - | - | 470 | uF
| | | | - | - | 220# | uF
| | | | - | - | 220# | uF
| | | | - | - | 1000 | uF
| | | | - | - | 470 | uF
| | | | - | - | 220# | uF
| | | | - | - | 220# | uF
| | | | - | - | 470 | uF
| | | | - | - | 220# | uF
| | | | - | - | 220# | uF
### Electrical Specifications

#### Output Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Ripple, pk-pk</td>
<td>20MHz bandwidth, measured with a 1uF MLCC and a 10uF Tantalum Capacitor</td>
<td>$V_o$</td>
<td>-</td>
<td>75</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>5V Output Models</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Other Output Models</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line Regulation</td>
<td>$V_{ILDC}$ to $V_{IL/max}$</td>
<td>$\pm V_o$</td>
<td>-</td>
<td>0.3</td>
<td>0.5</td>
<td>%</td>
</tr>
<tr>
<td>Load Regulation</td>
<td>$I_o$ to $25%I_{omax}$ to $I_{omax}$</td>
<td>$\pm V_o$</td>
<td>-</td>
<td>0.5</td>
<td>1.0</td>
<td>%</td>
</tr>
<tr>
<td>$V_o$ Dynamic Response</td>
<td>Peak Deviation, Settling Time 25% load change, slew rate = 1A/s</td>
<td>$\pm V_o$</td>
<td>-</td>
<td>3</td>
<td>6</td>
<td>500</td>
</tr>
<tr>
<td>Temperature Coefficient</td>
<td>All</td>
<td>$%/^{\circ}C$</td>
<td>-</td>
<td>0.02</td>
<td>0.05</td>
<td>%</td>
</tr>
<tr>
<td>Switching Frequency</td>
<td>All</td>
<td>$f_{SW}$</td>
<td>-</td>
<td>150</td>
<td>-</td>
<td>KHz</td>
</tr>
<tr>
<td>Output Over Current Protection</td>
<td>All</td>
<td>120</td>
<td>150</td>
<td>-</td>
<td>%$I_{omax}$</td>
<td></td>
</tr>
<tr>
<td>Output Short Circuit Protection</td>
<td>All</td>
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<td></td>
<td></td>
<td></td>
<td>Continuous</td>
</tr>
</tbody>
</table>
ASA01A12-M Performance Curves

![Figure 1: ASA01A12-M Efficiency Versus Output Current Curve (Vin = 9 to 18Vdc, Load: Io = 0 to 1A)](image)

![Figure 2: ASA01A12-M Efficiency Versus Input Voltage Curve (Vin = 9 to 18Vdc, Load: Io = 1A)](image)

![Figure 3: ASA01A12-M Ripple and Noise Measurement (Vin = 12Vdc, Load: Io = 1A, Ch1: Vo)](image)

![Figure 4: ASA01A12-M Transient Response (Vin = 12Vdc, Load: Io = 100% to 75% load change, Ch1: Vo)](image)

![Figure 5: ASA01A12-M Output Voltage Startup Characteristic by Vin (Vin = 12Vdc, Load: Io = 1A, Ch1: Vin, Ch2: Vo)](image)

![Figure 6: ASA01A12-M Output Current Versus Ambient Temperature (Vin = 12Vdc, Load: Io = 1A)](image)
Electrical Specifications

ASA01A12-M Performance Curves

Figure 7: ASA01A12-M Conduction Emission of EN55022 Class A
Vin = 12Vdc  Load: Io = 1A

Figure 8: ASA01A12-M Conduction Emission of EN55022 Class B
Vin = 12Vdc  Load: Io = 1A

Note - All test conditions are at 25 °C
Electrical Specifications

ASA001B12-M Performance Curves

Figure 9: ASA001B12-M Efficiency Versus Output Current Curve
Vin = 9 to 18Vdc  Load: Io = 0 to 0.5A

Figure 10: ASA001B12-M Efficiency Versus Input Voltage Curve
Vin = 9 to 18Vdc  Load: Io = 0.5A

Figure 11: ASA001B12-M Ripple and Noise Measurement
Vin = 12Vdc  Load: Io = 0.5A
Ch 1: Vo

Figure 12: ASA001B12-M Transient Response
Vin = 12Vdc  Load: Io = 100% to 75% load change
Ch 1: Vo

Figure 13: ASA001B12-M Output Voltage Startup Characteristic by Vin
Vin = 12Vdc  Load: Io = 0.5A
Ch 1: Vin  Ch 2: Vo

Figure 14: ASA001B12-M Output Current Versus Ambient Temperature
Vin = 12Vdc  Load: Io = 0.5A

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ASA001B12-M Performance Curves

Figure 15: ASA001B12-M Conduction Emission of EN55022 Class A
Vin = 12Vdc Load: Io = 0.5A

Figure 16: ASA001B12-M Conduction Emission of EN55022 Class B
Vin = 12Vdc Load: Io = 0.5A

Note – All test conditions are at 25 °C
Electrical Specifications

ASA01BB12-M Performance Curves

Figure 17: ASA01BB12-M Efficiency Versus Output Current Curve
Vin = 9 to 18Vdc, Load: Io = 0 to ± 0.25A

Figure 18: ASA01BB12-M Efficiency Versus Input Voltage Curve
Vin = 9 to 18Vdc, Load: Io = ± 0.25A

Figure 19: ASA01BB12-M Ripple and Noise Measurement
Vin = 12Vdc, Load: Io = ± 0.25A
Ch1: Vout1, Ch2: Vout2

Figure 20: ASA01BB12-M Transient Response
Vin = 12Vdc, Load: Io = 100% to 75% load change
Ch1: Vout1, Ch2: Vout2

Figure 21: ASA01BB12-M Output Voltage Startup Characteristic by Vin
Vin = 12Vdc, Load: Io = ± 0.25A
Ch1: Vin, Ch2: Vout

Figure 22: ASA01BB12-M Output Current Versus Ambient Temperature
Vin = 12Vdc, Load: Io = ± 0.25A

Natural convection

-40 0 20 60 100 110 80 40
Ambient Temperature

Output Power (%)

0 20 40 60 80 100

Rev.10.29.20_#1.1
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Electrical Specifications

ASA01BB12-M Performance Curves

Figure 23:  ASA01BB12-M Conduction Emission of EN55022 Class A
Vin = 12Vdc  Load: Io = ± 0.25A

Note - All test conditions are at 25 °C

Figure 24:  ASA01BB12-M Conduction Emission of EN55022 Class B
Vin = 12Vdc  Load: Io = ± 0.25A
ASA 6W Series

Electrical Specifications

ASA01CC12-M Performance Curves

Figure 25: ASA01CC12-M Efficiency Versus Output Current Curve
Vin = 9 to 18Vdc  Load: Io = 0 to ± 0.2A

Figure 26: ASA01CC12-M Efficiency Versus Input Voltage Curve
Vin = 9 to 18Vdc  Load: Io = ± 0.2A

Figure 27: ASA01CC12-M Ripple and Noise Measurement
Vin = 12Vdc  Load: Io = ± 0.2A
Ch1: Vout1  Ch2: Vout2

Figure 28: ASA01CC12-M Transient Response
Vin = 12Vdc  Load: Io = 100% to 75% load change
Ch1: Vout1  Ch2: Vout2

Figure 29: ASA01CC12-M Output Voltage Startup Characteristic by Vin
Vin = 12Vdc  Load: Io = ± 0.2A
Ch1: Vin  Ch2: Vout

Figure 30: ASA01CC12-M Output Current Versus Ambient Temperature
Vin = 12Vdc  Load: Io = ± 0.2A

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Rev.10.29.20_.#1.1
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Electrical Specifications

ASA01CC12-M Performance Curves

Figure 31: ASA01CC12-M Conduction Emission of EN55022 Class A
Vin = 12Vdc  Load: lo = ± 0.2A

Figure 32: ASA01CC12-M Conduction Emission of EN55022 Class B
Vin = 12Vdc  Load: lo = ± 0.2A

Note - All test conditions are at 25 °C
Electrical Specifications

ASA01A24-M Performance Curves

Figure 33: ASA01A24-M Efficiency Versus Output Current Curve
Vin = 18 to 36Vdc  Load: Io = 0 to 1A

Figure 34: ASA01A24-M Efficiency Versus Input Voltage Curve
Vin = 18 to 36Vdc  Load: Io = 1A

Figure 35: ASA01A24-M Ripple and Noise Measurement
Vin = 24Vdc  Load: Io = 1A
Ch 1: Vo

Figure 36: ASA01A24-M Transient Response
Vin = 24Vdc  Load: Io = 100% to 75% load change
Ch 1: Vo

Figure 37: ASA01A24-M Output Voltage Startup Characteristic by Vin
Vin = 24Vdc  Load: Io = 1A
Ch 1: Vin  Ch 2: Vo

Figure 38: ASA01A24-M Output Current Versus Ambient Temperature
Vin = 24Vdc  Load: Io = 1A

~

Ambient Temperature
Output Power (%)
0 20 40 60 80

Natural
convection

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Rev.10.29.20_.#1.1
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Electrical Specifications

ASA01A24-M Performance Curves

Figure 39: ASA01A24-M Conduction Emission of EN55022 Class A
Vin = 24Vdc   Load: Io = 1A

Figure 40: ASA01A24-M Conduction Emission of EN55022 Class B
Vin = 24Vdc   Load: Io = 1A

Note - All test conditions are at 25 °C
Electrical Specifications

ASA01B24-M Performance Curves

Figure 41: ASA01B24-M Efficiency Versus Output Current Curve
Vin = 18 to 36Vdc  Load: Io = 0 to 0.5A

Figure 42: ASA01B24-M Efficiency Versus Input Voltage Curve
Vin = 18 to 36Vdc  Load: Io = 0.5A

Figure 43: ASA01B24-M Ripple and Noise Measurement
Vin = 24Vdc  Load: Io = 0.5A
Ch1: Vo

Figure 44: ASA01B24-M Transient Response
Vin = 24Vdc  Load: Io = 100% to 75% load change
Ch1: Vo

Figure 45: ASA01B24-M Output Voltage Startup Characteristic by Vin
Vin = 24Vdc  Load: Io = 0.5A
Ch1: Vin  Ch2: Vo

Figure 46: ASA01B24-M Output Current Versus Ambient Temperature
Vin = 24Vdc  Load: Io = 0.5A
Electrical Specifications

ASA01B24-M Performance Curves

Figure 47: ASA01B24-M Conduction Emission of EN55022 Class A
Vin = 24Vdc    Load: Io = 0.5A

Figure 48: ASA01B24-M Conduction Emission of EN55022 Class B
Vin = 24Vdc    Load: Io = 0.5A

Note – All test conditions are at 25 °C
ASA 6W Series

Electrical Specifications

ASA01BB24-M Performance Curves

Figure 40: ASA01BB24-M Efficiency Versus Output Current Curve
Vin = 18 to 36Vdc Load: Io = ± 0.25A

Figure 41: ASA01BB24-M Efficiency Versus Input Voltage Curve
Vin = 18 to 36Vdc Load: Io = ± 0.25A

Figure 50: ASA01BB24-M Ripple and Noise Measurement
Vin = 24Vdc Load: Io = ± 0.25A
Ch 1: Vout1 Ch 2: Vout2

Figure 52: ASA01BB24-M Transient Response
Vin = 24Vdc Load: Io = 100% to 75% load change
Ch 1: Vout1 Ch 2: Vout2

Figure 53: ASA01BB24-M Output Voltage Startup Characteristic by Vin
Vin = 24Vdc Load: Io = ± 0.25A
Ch 1: Vin Ch 2: Vout

Figure 54: ASA01BB24-M Output Current Versus Ambient Temperature
Vin = 24Vdc Load: Io = ± 0.25A

Advanced Energy

Rev.10.29.20.#11
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Electrical Specifications

ASA01BB24-M Performance Curves

Figure 55: ASA01BB24-M Conduction Emission of EN55022 Class A
Vin = 24Vdc  Load: Io = ± 0.25A

Figure 56: ASA01BB24-M Conduction Emission of EN55022 Class B
Vin = 24Vdc  Load: Io = ± 0.25A

Note - All test conditions are at 25 °C
Electrical Specifications

ASA01CC24-M Performance Curves

Figure 57: ASA01CC24-M Efficiency Versus Output Current Curve
Vin = 18 to 36Vdc  Load: Io = 0 to ± 0.2A

Figure 58: ASA01CC24-M Efficiency Versus Input Voltage Curve
Vin = 18 to 36Vdc  Load: Io = ± 0.2A

Figure 59: ASA01CC24-M Ripple and Noise Measurement
Vin = 24Vdc  Load: Io = ± 0.2A
Ch 1: Vout1  Ch 2: Vout2

Figure 60: ASA01CC24-M Transient Response
Vin = 24Vdc  Load: Io = 100% to 75% load change
Ch 1: Vout1  Ch 2: Vout2

Figure 61: ASA01CC24-M Output Voltage Startup Characteristic by Vin
Vin = 24Vdc  Load: Io = ± 0.2A
Ch 1: Vin  Ch 2: Vout

Figure 62: ASA01CC24-M Output Current Versus Ambient Temperature
Vin = 24Vdc  Load: Io = ± 0.2A

Advanced Energy
Electrical Specifications

ASA01CC24-M Performance Curves

Figure 63: ASA01CC24-M Conduction Emission of EN55022 Class A
Vin = 24Vdc  Load: Io = ± 0.2A

Figure 64: ASA01CC24-M Conduction Emission of EN55022 Class B
Vin = 24Vdc  Load: Io = ± 0.2A

Note - All test conditions are at 25 °C
ASA 6W Series

Electrical Specifications

ASA01A48-M Performance Curves

Figure 65: ASA01A48-M Efficiency Versus Output Current Curve
Vin = 36 to 75Vdc  Load: Io = 0 to 1A

Figure 66: ASA01A48-M Efficiency Versus Input Voltage Curve
Vin = 36 to 75Vdc  Load: Io = 1A

Figure 67: ASA01A48-M Ripple and Noise Measurement
Vin = 48Vdc  Load: Io = 1A
Ch 1: Vo

Figure 68: ASA01A48-M Transient Response
Vin = 48Vdc  Load: Io = 100% to 75% load change
Ch 1: Vo

Figure 69: ASA01A48-M Output Voltage Startup Characteristic by Vin
Vin = 48Vdc  Load: Io = 1A
Ch 1: Vin  Ch 2: Vo

Figure 70: ASA01A48-M Output Current Versus Ambient Temperature
Vin = 48Vdc  Load: Io = 1A

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Rev.10.29.20, #1.1 advancedenergy.com
Electrical Specifications

ASA01A48-M Performance Curves

Figure 71:  ASA01A48-M Conduction Emission of EN55022 Class A
Vin = 48Vdc    Load: Io = 1A

Figure 72:  ASA01A48-M Conduction Emission of EN55022 Class B
Vin = 48Vdc    Load: Io = 1A

Note - All test conditions are at 25 °C
ASA 6W Series

Electrical Specifications

ASA01B48-M Performance Curves

Figure 73: ASA01B48-M Efficiency Versus Output Current Curve
Vin = 36 to 75Vdc  Load: Io = 0 to 0.5A

Figure 74: ASA01B48-M Efficiency Versus Input Voltage Curve
Vin = 36 to 75Vdc  Load: Io = 0.5A

Figure 75: ASA01B48-M Ripple and Noise Measurement
Vin = 48Vdc  Load: Io = 0.5A
Ch 1: Vo

Figure 76: ASA01B48-M Transient Response
Vin = 48Vdc  Load: Io = 100% to 75% load change
Ch 1: Vo

Figure 77: ASA01B48-M Output Voltage Startup Characteristic by Vin
Vin = 48Vdc  Load: Io = 0.5A
Ch 1: Vin  Ch 2: Vo

Figure 78: ASA01B48-M Output Current Versus Ambient Temperature
Vin = 48Vdc  Load: Io = 0.5A

Natural convection

Ambient Temperature

Output Power (%)

0 20 40 60 80 100 110

-40 0 20 60 100

Advanced Energy
Rev.10.29.20_.#1.1
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ASA01B48-M Performance Curves

Figure 79: ASA01B48-M Conduction Emission of EN55022 Class A
Vin = 48Vdc Load: Io = 0.5A

Figure 80: ASA01B48-M Conduction Emission of EN55022 Class B
Vin = 48Vdc Load: Io = 0.5A

Note – All test conditions are at 25 °C
Electrical Specifications

ASA01BB48-M Performance Curves

Figure 81: ASA01BB48-M Efficiency Versus Output Current Curve
Vin = 36 to 75Vdc  Load: Io = ± 0.25A

Figure 82: ASA01BB48-M Efficiency Versus Input Voltage Curve
Vin = 36 to 75Vdc  Load: Io = ± 0.25A

Figure 83: ASA01BB48-M Ripple and Noise Measurement
Vin = 48Vdc  Load: Io = ± 0.25A
Ch 1: Vin  Ch 2: Vout1

Figure 84: ASA01BB48-M Transient Response
Vin = 48Vdc  Load: Io = 100% to 75% load change
Ch 1: Vout1  Ch 2: Vout2

Figure 85: ASA01BB48-M Output Voltage Startup Characteristic by Vin
Vin = 48Vdc  Load: Io = ± 0.25A
Ch 1: Vout  Ch 2: Vout2

Figure 86: ASA01BB48-M Output Current Versus Ambient Temperature
Vin = 48Vdc  Load: Io = ± 0.25A
Electrical Specifications

ASA01BB48-M Performance Curves

Figure 87:  ASA01BB48-M Conduction Emission of EN55022 Class A
Vin = 48Vdc  Load: Io = ± 0.25A

Figure 88:  ASA01BB48-M Conduction Emission of EN55022 Class B
Vin = 48Vdc  Load: Io = ± 0.25A

Note - All test conditions are at 25 °C
ASA 6W Series

Electrical Specifications

ASA01CC48-M Performance Curves

Figure 8B: ASA01CC48-M Efficiency Versus Output Current Curve
Vin = 36 to 75Vdc  Load: Io = 0 to ± 0.2A

Figure 8C: ASA01CC48-M Efficiency Versus Input Voltage Curve
Vin = 36 to 75Vdc  Load: Io = ± 0.2A

Figure 9A: ASA01CC48-M Ripple and Noise Measurement
Vin = 48Vdc  Load: Io = ± 0.2A
Ch 1: Vout1  Ch 2: Vout2

Figure 9B: ASA01CC48-M Output Voltage Startup Characteristic by Vin
Vin = 48Vdc  Load: Io = ± 0.2A
Ch 1: Vin  Ch 2: Vout

Figure 9C: ASA01CC48-M Output Current Versus Ambient Temperature
Vin = 48Vdc  Load: Io = ± 0.2A

Advanced Energy
Rev.10.29.20_1.1
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ASA01CC48-M Performance Curves

Figure 95: ASA01CC48-M Conduction Emission of EN55022 Class A
Vin = 48Vdc  Load: Io = ± 0.2A

Figure 96: ASA01CC48-M Conduction Emission of EN55022 Class B
Vin = 48Vdc  Load: Io = ± 0.2A

Note - All test conditions are at 25 °C
Mechanical Specifications

Mechanical Outlines (unit: mm)

Pin Connections

Single output
- Pin 1: +Vin
- Pin 11: No Pin
- Pin 12: -Vout
- Pin 13: +Vout
- Pin 15: No Pin
- Pin 23: -Vin
- Pin 24: -Vin

Dual Output
- Pin 1: +Vin
- Pin 11: Common
- Pin 12: No Pin
- Pin 13: -Vout
- Pin 15: +Vout
- Pin 23: -Vin
- Pin 24: -Vin

Note:
1. All dimensions in mm (inches)
2. Tolerance: XX±0.25 (XXX±0.005) [X.XXX±0.0005]
3. Pin pitch tolerance: 0.25 (±0.01)
4. Pin tolerance: ±0.05 (±0.002)

Physical Characteristics

<table>
<thead>
<tr>
<th>Device code suffix</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Size</td>
<td>31.8x20.3x12mm (1.25x0.8x0.47 inches)</td>
</tr>
<tr>
<td>Case Material</td>
<td>Non-Conductive Black Plastic (flammability to UL 94V-0 rated)</td>
</tr>
<tr>
<td>Weight</td>
<td>18g</td>
</tr>
</tbody>
</table>
1. All dimensions in inches (mm)
   Tolerance: ±0.02" (±0.5mm)
   xxx±0.01" (xxx ±0.25mm)
2. Pin pitch tolerance: ±0.01" (±0.25mm)
Power Derating Curves
ASA6W Series can operate up to a maximum ambient temperature of 75°C with derating.

Notes:
1. Specifications typical at Ta=+25°C, resistive load, nominal input voltage and rated output current unless otherwise noted.
2. Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3. Ripple & Noise measurement bandwidth is 0-20 MHz.
4. These power converters require a minimum output loading to maintain specified regulation, operation under no-load conditions will not damage these modules; however, they may not meet all specifications listed.
5. All DC/DC converters should be externally fused at the front end for protection.
6. Other input and output voltage may be available, please contact factory.
7. Specifications subject to change without notice.
Weight

The ASA6W series weight is 18g maximum.
EMC Considerations

EMI-Filter to meet EN 55022, class B, FCC part 15, class B
Conducted and radiated emissions EN55022 Class B

Recommended PCB Layout with Input Filter

<table>
<thead>
<tr>
<th>Table 4. Conducted EMI emission specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
</tr>
<tr>
<td>ASAXXX12-M</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ASAXXX24-M</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ASAXXX48-M</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Safety Certifications

The ASA 6W-M series power supply is intended for inclusion in other equipment and the installer must ensure that it is in compliance with all the requirements of the end application. This product is only for inclusion by professional installers within other equipment and must not be operated as a stand alone product.

<table>
<thead>
<tr>
<th>Document</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cUL/UL 62368-1 (CSA certificate)</td>
<td>US and Canada Requirements</td>
</tr>
<tr>
<td>IEC/EN 62368-1 (CB-scheme)</td>
<td>European Requirements</td>
</tr>
</tbody>
</table>
### MTBF and Reliability

The MTBF of ASA6W series of DC/DC converters has been calculated using MIL-HDBK 217F NOTICE2, Operating Temperature 25 °C, Ground Benign.

<table>
<thead>
<tr>
<th>Model</th>
<th>MTBF</th>
<th>Unit</th>
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<tbody>
<tr>
<td>ASA01A12-M</td>
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<tr>
<td>ASA01B12-M</td>
<td>1,065,303</td>
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<tr>
<td>ASA01BB12-M</td>
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<tr>
<td>ASA01CC12-M</td>
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<td>ASA01A24-M</td>
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<tr>
<td>ASA01CC48-M</td>
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</table>
Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor Lin (4.7μH) and Cin (220μF, ESR < 1.0Ω at 100 KHz) to simulate source impedance. Capacitor Cin, offsets possible battery impedance. Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500 KHz.

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Lin</td>
<td>4.7μH</td>
<td>-</td>
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<tr>
<td>Cin</td>
<td>220μF (ESR&lt;1.0Ω at 100KHz)</td>
<td>Aluminum Electrolytic Capacitor</td>
</tr>
</tbody>
</table>
Peak-to-Peak Output Noise Measurement Test

Use a 0.47uF ceramic capacitor. Scope measurement should be made by using a BNC socket, measurement bandwidth is 0-20MHz. Position the load between 50 mm and 75 mm from the DC/DC Converter.

Output voltage and efficiency measurement test set up

\[
Efficiency = \left( \frac{V_{\text{out}} \times I_{\text{out}}}{V_{\text{in}} \times I_{\text{in}}} \right) \times 100\% = [\%]
\]

Short Circuitry Protection

Continuous, hiccup and auto-recovery mode.

During short circuit, converter still shut down, The average current during this condition will be very low and the device will be safe in this condition.
Input Source Impedance

The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.

In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.

Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 10μF for the 12V input devices and a 4.7μF for the 24V input devices and a 2.2μF for the 48V devices.
Thermal Considerations
Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 95°C. The derating curves are determined from measurements obtained in a test setup.

Position of air velocity probe and thermocouple
50mm / 2in

Air Flow

15mm / 0.6in

DUT

Maximum Capacitive Load
The ASA6W series has limitation of maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time. Connect capacitors at the point of load for best performance. The maximum capacitance can be found in the data sheet.
Packaging Information

TUBE

unit: mm

10 PCS per TUBE

Soldering and Reflow Considerations
Lead free wave solder profile for ASA6W Series
## Record of Revision and Changes

<table>
<thead>
<tr>
<th>Issue</th>
<th>Date</th>
<th>Description</th>
<th>Originators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>07.11.2016</td>
<td>First Issue</td>
<td>S. Dong</td>
</tr>
<tr>
<td>1.1</td>
<td>10.29.2020</td>
<td>Update 60950 to 62368</td>
<td>J. Ma</td>
</tr>
</tbody>
</table>
ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

PRECISION | POWER | PERFORMANCE

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