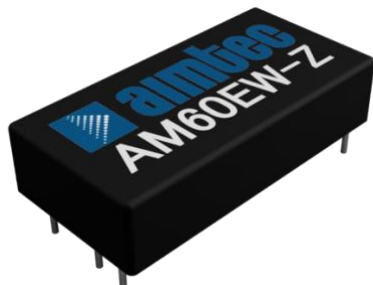


## Series AM60EW-Z

### 60 Watt | DC-DC Converter



#### FEATURES:

- Wide Input 4:1 Range
- No Minimum Load Required
- Soft Start
- Efficiency up to 93%
- 1600 VDC Isolation
- Adjustable Output Voltage
- Remote ON/OFF Function
- Operating temperature -40°C to + 75°C
- Over Current, Over Voltage, Over Temperature & Continuous Short Circuit Protection

#### Models Single output



| Model         | Input Voltage (V) | Input Current No load/Full load (mA) | Output Voltage (V) | Output Current max (A) | Max Capacitive load (μF) | Efficiency (%) |
|---------------|-------------------|--------------------------------------|--------------------|------------------------|--------------------------|----------------|
| AM60EW-2405SZ | 9-36              | 25/2703                              | 5                  | 12                     | 30,000                   | 92.5           |
| AM60EW-2412SZ | 9-36              | 25/2703                              | 12                 | 5                      | 5850                     | 92.5           |
| AM60EW-2415SZ | 9-36              | 25/2688                              | 15                 | 4                      | 3900                     | 93             |
| AM60EW-4805SZ | 18-75             | 25/1344                              | 5                  | 12                     | 30,000                   | 93             |
| AM60EW-4812SZ | 18-75             | 25/1351                              | 12                 | 5                      | 5850                     | 92.5           |
| AM60EW-4815SZ | 18-75             | 25/1344                              | 15                 | 4                      | 3900                     | 93             |

#### Models Dual output

| Model         | Input Voltage (V) | Input Current No load/Full load (mA) | Output Voltage (V) | Output Current max (A) | Max Capacitive load (μF) | Efficiency (%) |
|---------------|-------------------|--------------------------------------|--------------------|------------------------|--------------------------|----------------|
| AM60EW-2412DZ | 9-36              | 40/2747                              | ±12                | ±2.5                   | ±3900                    | 91             |
| AM60EW-2415DZ | 9-36              | 50/2747                              | ±15                | ±2                     | ±2400                    | 91             |
| AM60EW-4812DZ | 18-75             | 40/1373                              | ±12                | ±2.5                   | ±3900                    | 91             |
| AM60EW-4815DZ | 18-75             | 50/1373                              | ±15                | ±2                     | ±2400                    | 91             |

Add suffix "-K" for optional heatsink

NOTE: All specifications in this datasheet are measured at an ambient temperature of 25°C, humidity<75%, nominal input voltage and at rated output load unless otherwise specified.

#### Input Specifications

| Parameters                     | Nominal                                                                                       | Typical            | Maximum   | Units  |
|--------------------------------|-----------------------------------------------------------------------------------------------|--------------------|-----------|--------|
| Voltage range                  | 24<br>48                                                                                      | 9-36<br>18-75      |           | VDC    |
| Filter                         | π(Pi) Network                                                                                 |                    |           |        |
| Start up time                  |                                                                                               | 60                 |           | ms     |
| Absolute Maximum Rating        | 24<br>48                                                                                      |                    | 50<br>100 | VDC    |
| Peak Input Voltage time        |                                                                                               |                    | 100       | ms     |
| Input reflected ripple current | Measured with the referenced circuit                                                          |                    | 20        | mA p-p |
| Under Voltage Lockout (On/Off) | (24V model)<br>(48V model)                                                                    | 8.6/7.9<br>17.8/16 |           | VDC    |
| Remote On / OFF Control        | ON: 3 ~12Vdc or Open Circuit<br>OFF: 0 ~ 1.2Vdc or Short pin 2 & 3 (idle current 5mA typical) |                    |           | VDC    |

#### Isolation Specifications

| Parameters           | Conditions | Typical | Rated | Units |
|----------------------|------------|---------|-------|-------|
| Tested I/O voltage   | 60s        |         | 1600  | VDC   |
| Case/ Input & Output | 60s        |         | 1600  | VDC   |
| Resistance           |            | >1000   |       | MOhm  |
| Capacitance          |            | 2200    |       | pF    |

### Output Specifications

| Parameters                   | Conditions                    | Typical | Maximum | Units     |
|------------------------------|-------------------------------|---------|---------|-----------|
| Voltage accuracy             |                               |         | ±1      | %         |
| Over voltage protection      | Zener Diode Clamp, 5V output  | 6.2     |         | V         |
|                              | Zener Diode Clamp, 12V output | 15      |         |           |
|                              | Zener Diode Clamp, 15V output | 20      |         |           |
| Over current protection      |                               | 140     |         | % of Iout |
| Short circuit protection     | Hiccup, continuous            |         |         |           |
| Short circuit restart        | Auto-recovery                 |         |         |           |
| Thermal shutdown             | On Case                       | 115     |         | °C        |
| Line voltage regulation      |                               |         | ±0.5    | % of Vin  |
| Load voltage regulation      | 0% to 100%, Single output     |         | ±0.5    | %         |
|                              | 0% to 100%, Dual output       |         | ±1      |           |
| Cross regulation*            |                               |         | ±5      | %         |
| Temperature coefficient      |                               | ±0.02   |         | %/°C      |
| Ripple & Noise**             | 20MHz Bandwidth               |         | 100     | mV p-p    |
| Transient Response Deviation | 25% load step change          |         | ±3      | % of Max  |
| Transient Recovery           | 25% load step change          | 250     |         | µsec      |
| Voltage adjustment range     |                               |         | ±10     | %         |

\* One of the outputs is at 100% load while the other output is at 25% to 100% load.

\*\* Measured at 20MHz bandwidth with a 1µF ceramic capacitor. Please refer to the application note for specific details.

### General Specifications

| Parameters                    | Conditions                                   | Typical                                          | Maximum | Units |
|-------------------------------|----------------------------------------------|--------------------------------------------------|---------|-------|
| Switching frequency           | 100% load                                    | 225                                              |         | KHz   |
| Operating temperature         | With derating (see graph below)              | -40 to +75                                       |         | °C    |
| Storage temperature           |                                              | -55 to +125                                      |         | °C    |
| Maximum case temperature      |                                              |                                                  | 110     | °C    |
| Cooling                       | Free Air Convection (30-60LFM)               |                                                  |         |       |
| Humidity                      |                                              |                                                  | 95      | % RH  |
| Case material                 | Non-conductive Black Plastic (UL94V-0 rated) |                                                  |         |       |
| Weight                        | Pin mountable                                | 45                                               |         | g     |
|                               | With optional -K heatsink                    | 56.3                                             |         |       |
| Dimensions (L x W x H)        | Pin mountable                                | 2.00 x 1.00 x 0.45 inches 50.8 x 25.4 x 11.50 mm |         |       |
|                               | With optional -K heatsink                    | 2.00 x 1.00 x 0.69 inches 50.8 x 25.4 x 17.60 mm |         |       |
| MTBF                          | >210 000 hrs (MIL-HDBK-217 F at +25°C)       |                                                  |         |       |
| Maximum soldering temperature | 1.5mm from case for 10 sec                   |                                                  | 260     | °C    |

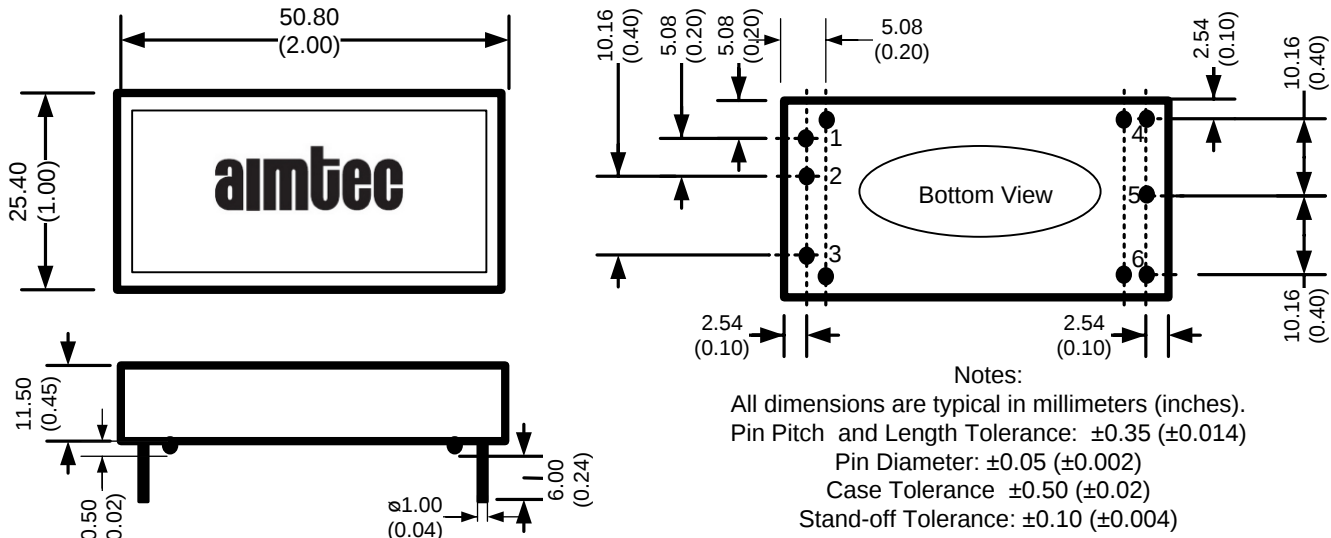
### Safety Specifications

| Parameters       |                                          |                                                               |
|------------------|------------------------------------------|---------------------------------------------------------------|
| Agency approvals | UL                                       |                                                               |
| Standards        | Information Technology Equipment         | UL62368-1                                                     |
|                  | EMI - Conducted and radiated emission    | EN55032, class A (with the recommended EMI circuit)           |
|                  | Electrostatic Discharge Immunity         | IEC 61000-4-2, Criteria A                                     |
|                  | RF, Electromagnetic Field Immunity       | IEC 61000-4-3, Criteria A                                     |
|                  | Electrical Fast Transient/Burst Immunity | IEC 61000-4-4, Criteria A, (with the recommended EMC circuit) |
|                  | Surge Immunity                           | IEC 61000-4-5, Criteria A, (with the recommended EMC circuit) |
|                  | RF, Conducted Disturbance Immunity       | IEC 61000-4-6, Criteria A                                     |
|                  | Power frequency Magnetic Field Immunity  | IEC 61000-4-8, Criteria A                                     |

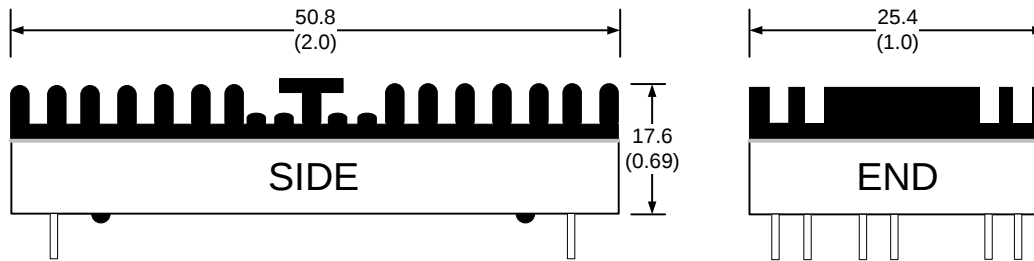
### Pin Out Specifications

| Pin | Single         | Dual           |
|-----|----------------|----------------|
| 1   | +V Input       | +V Input       |
| 2   | -V Input       | -V Input       |
| 3   | On/Off Control | On/Off Control |
| 4   | +V Output      | +V Output      |
| 5   | -V Output      | Common         |
| 6   | Trim           | -V Output      |

## Dimensions

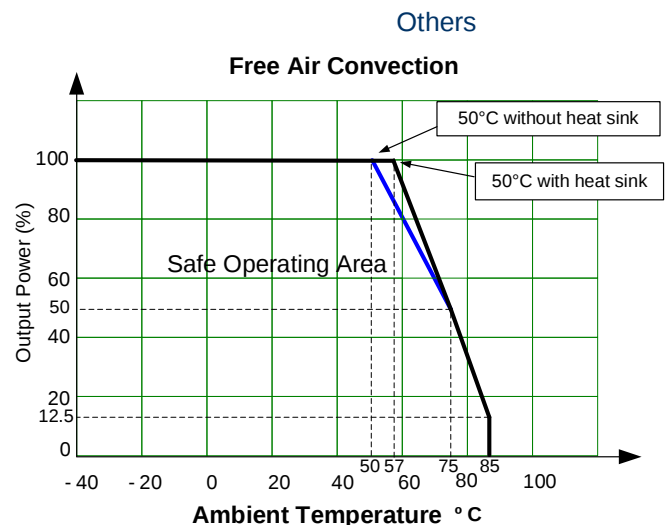
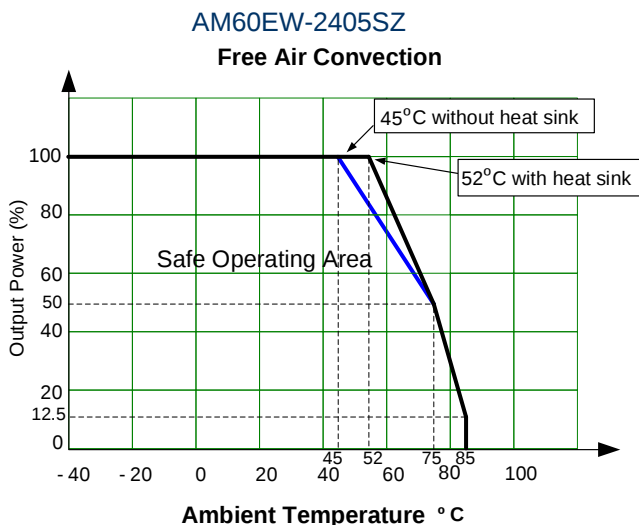


## Dimensions with Optional Heatsink



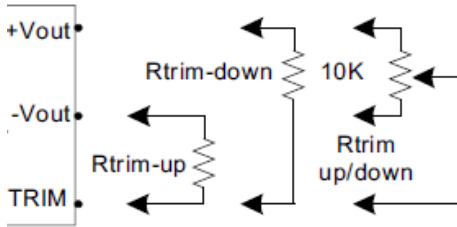
Notes: Add “-K” suffix for ordering, heatsink is affixed with thermally dissipative adhesive tape.  
See derating graph for temperature performance. Heatsink material is anodized (black) aluminum, adds weight 11g to total mass (56g). Thermal impedance of converter is: without heatsink 9.5°C/W and 8.5°C/W with heatsink.

## Derating



Extended temperature performance can be achieved with optional heatsink. (add suffix “-K” to part number).

## Trimming



Leave open if not used.

### AM60EW-xx05SZ

| Trim down %  | 1      | 2      | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    |
|--------------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| Vout (VDC)   | 4.95   | 4.9    | 4.85  | 4.8   | 4.75  | 4.7   | 4.65  | 4.6   | 4.55  | 4.5   |
| Rt down (KΩ) | 151.46 | 133.91 | 83.26 | 59.01 | 44.79 | 35.44 | 28.82 | 23.89 | 20.08 | 17.04 |
| Trim up %    | 1      | 2      | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    |
| Vout (VDC)   | 5.05   | 5.1    | 5.15  | 5.2   | 5.25  | 5.3   | 5.35  | 5.4   | 5.45  | 5.5   |
| Rt up (KΩ)   | 256.85 | 37.9   | 23.95 | 16.71 | 12.27 | 9.27  | 7.11  | 5.48  | 4.21  | 3.18  |

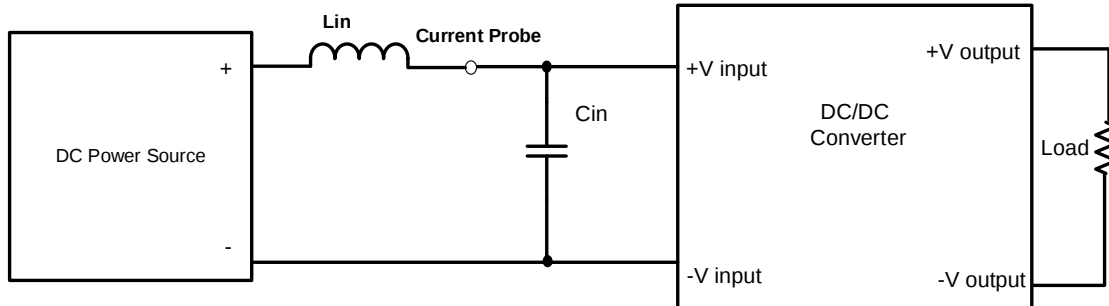
### AM60EW-xx12SZ

| Trim down %  | 1      | 2      | 3      | 4      | 5      | 6     | 7     | 8     | 9     | 10    |
|--------------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|
| Vout (VDC)   | 11.88  | 11.76  | 11.64  | 11.52  | 11.4   | 11.28 | 11.16 | 11.04 | 10.92 | 10.8  |
| Rt down (KΩ) | 638.7  | 309.72 | 198.29 | 142.24 | 108.49 | 85.95 | 69.83 | 57.73 | 48.31 | 40.76 |
| Trim up %    | 1      | 2      | 3      | 4      | 5      | 6     | 7     | 8     | 9     | 10    |
| Vout (VDC)   | 12.12  | 12.24  | 12.36  | 12.48  | 12.6   | 12.72 | 12.84 | 12.96 | 13.08 | 13.2  |
| Rt up (KΩ)   | 215.45 | 97.18  | 58.4   | 39.13  | 27.61  | 19.94 | 14.48 | 10.38 | 7.2   | 4.65  |

### AM60EW-xx15SZ

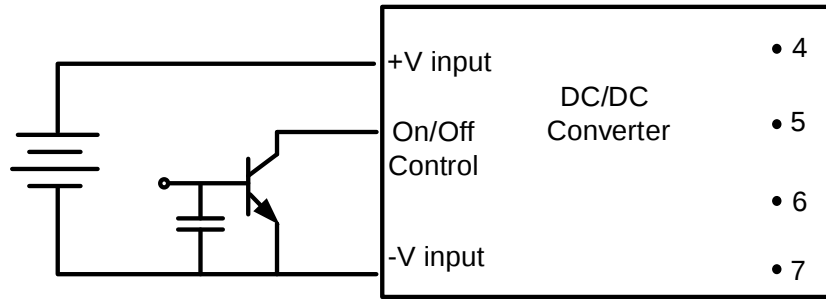
| Trim down %  | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8     | 9     | 10    |
|--------------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|
| Vout (VDC)   | 14.85  | 14.7   | 14.55  | 14.4   | 14.25  | 14.1   | 13.95  | 13.8  | 13.65 | 13.5  |
| Rt down (KΩ) | 842.92 | 431.72 | 283.82 | 207.67 | 161.24 | 129.97 | 107.49 | 90.54 | 77.31 | 66.69 |
| Trim up %    | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8     | 9     | 10    |
| Vout (VDC)   | 15.15  | 15.3   | 15.45  | 15.6   | 15.75  | 15.9   | 16.05  | 16.2  | 16.35 | 16.5  |
| Rt up (KΩ)   | 233.53 | 99.39  | 58.51  | 38.73  | 27.05  | 19.35  | 13.89  | 9.82  | 6.66  | 4.14  |

## Input reflected ripple current test circuit

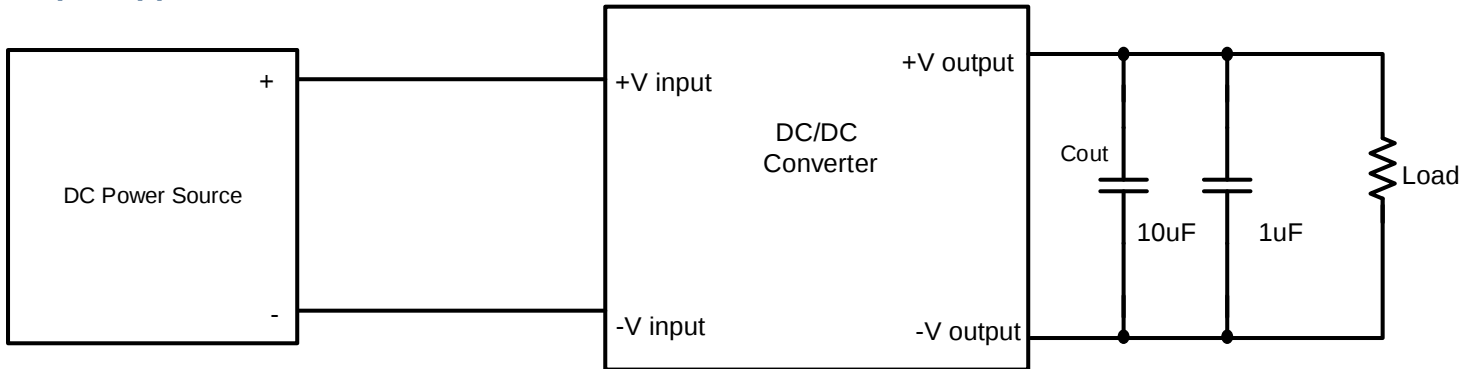


Input reflected ripple current is measured through a source inductor  $L_{in}$  (1μH) and a source capacitor  $C_{in}$  (22μF, ESR<1.0ohm at 100KHz) at a nominal input and full load

### Control ON/OFF pin connection example



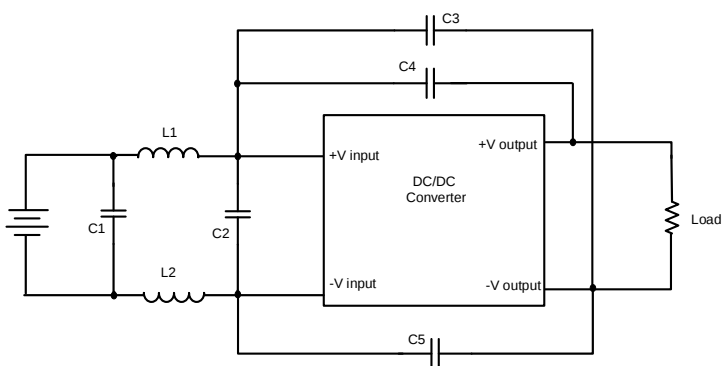
### Output ripple and noise reduction circuit



It is recommended to use a 1uF ceramic disk capacitor and a 10uF electrolytic capacitor to reduce the ripple and noise.

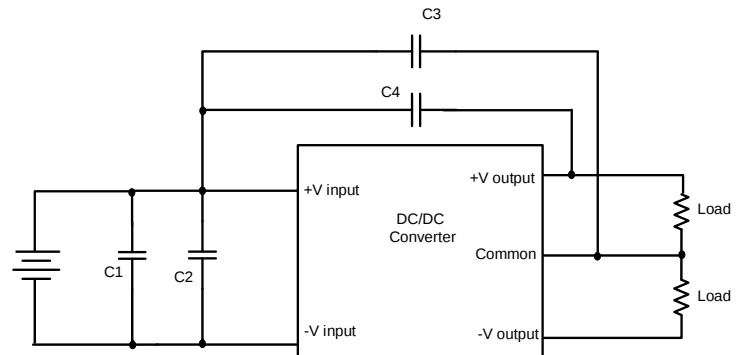
### EMI recommended circuit

#### Single output models



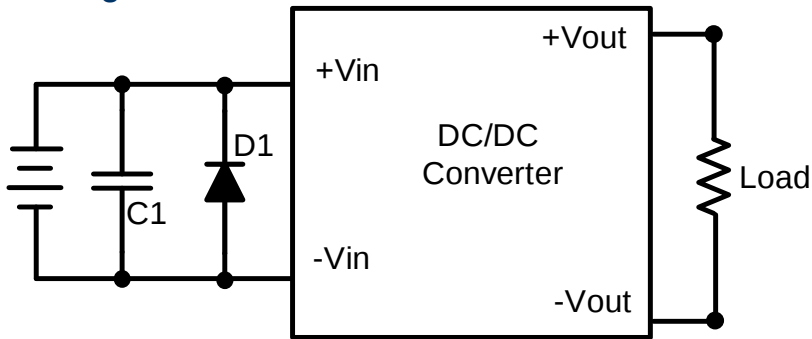
| Vin | C1, C2             | L1, L2     | C3           | C4, C5     |
|-----|--------------------|------------|--------------|------------|
| 24V | 4.7 $\mu$ F / 50V  | 12 $\mu$ H | 470 pF / 2KV | 1 nF / 2KV |
| 48V | 1.5 $\mu$ F / 100V |            |              |            |

#### Dual output models



| Vin | C1, C2             | C3           | C4           |
|-----|--------------------|--------------|--------------|
| 24V | 4.7 $\mu$ F / 50V  | 220 pF / 2KV | 1.5 nF / 2KV |
| 48V | 1.5 $\mu$ F / 100V |              |              |

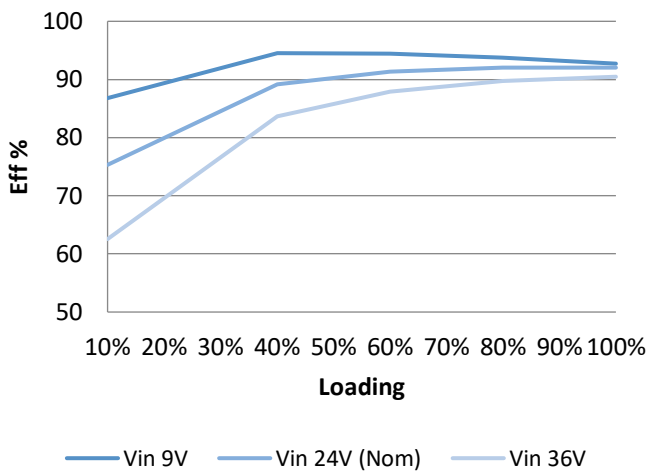
### EFT/Surge circuit recommendation



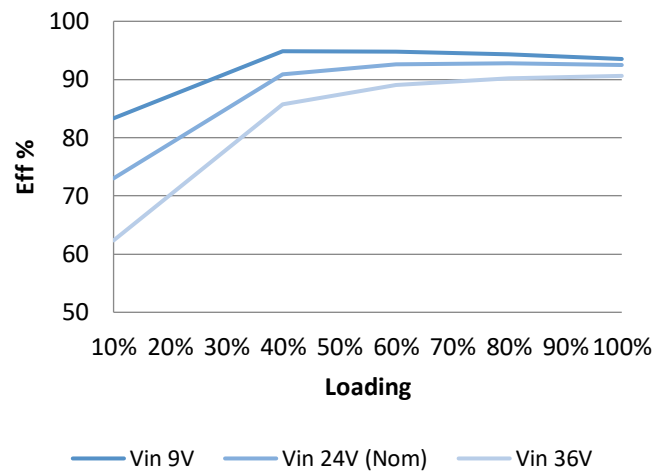
| Vin | C1                 | D1            |
|-----|--------------------|---------------|
| 24V | 330 $\mu$ F / 100V | TVS 58V, 3KW  |
| 48V |                    | TVS 120V, 3KW |

### Typical efficiency chart

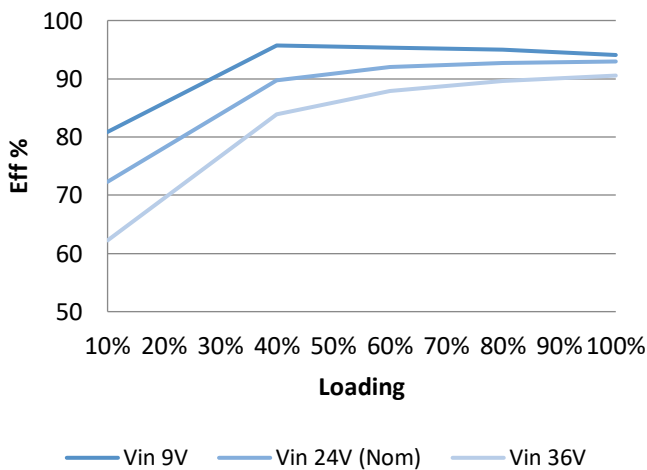
**AM60EW-2405SZ Loading vs. Efficiency**



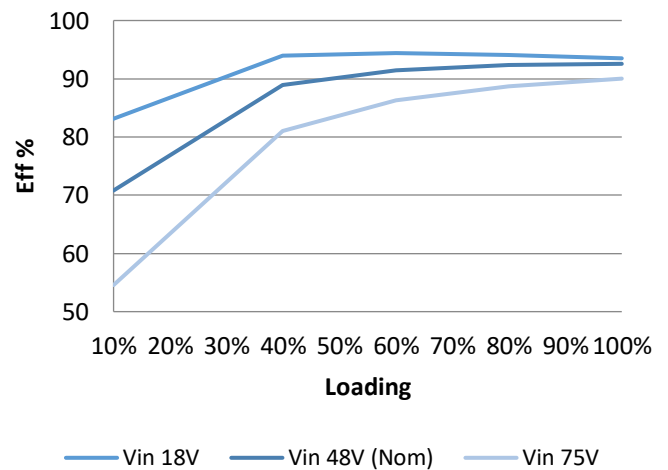
**AM60EW-2412SZ Loading vs. Efficiency**



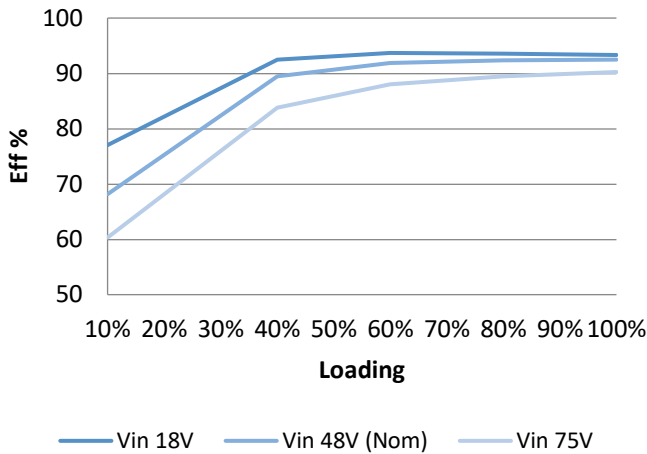
**AM60EW-2415SZ Loading vs. Efficiency**



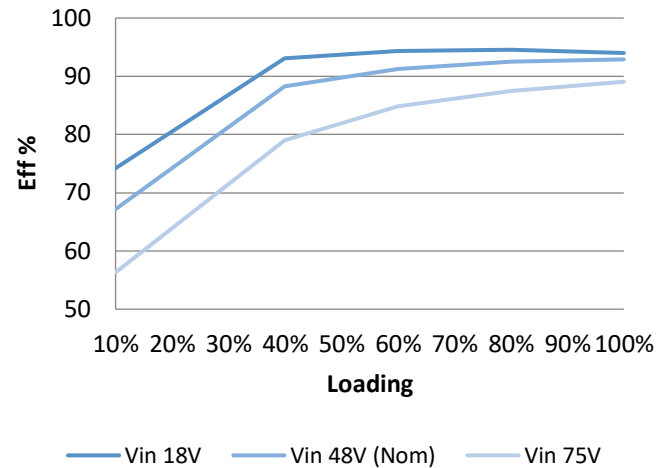
**AM60EW-4805SZ Loading vs. Efficiency**



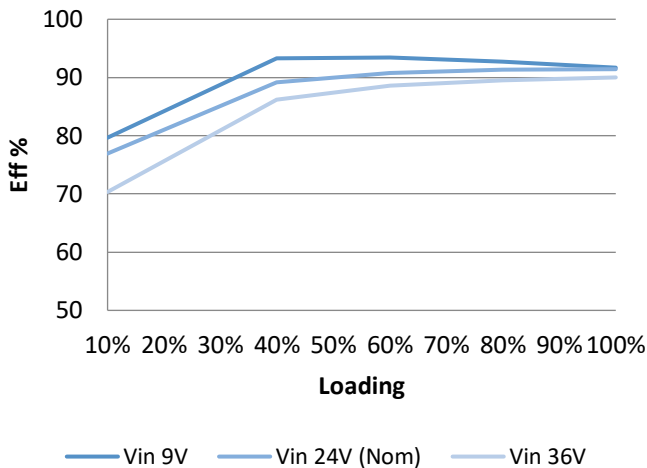
**AM60EW-4812SZ Loading vs. Efficiency**



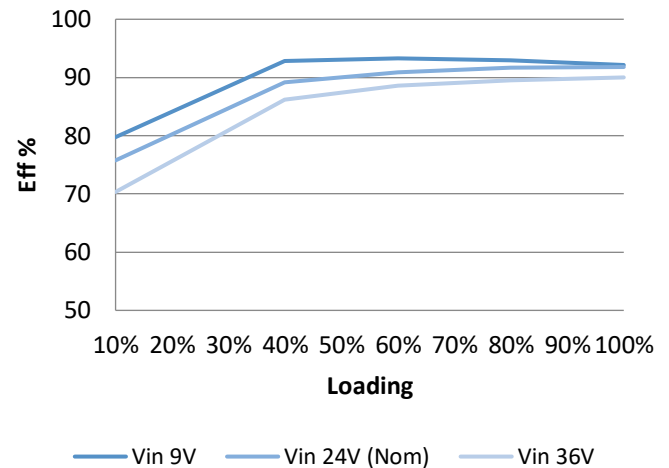
**AM60EW-4815SZ Loading vs. Efficiency**



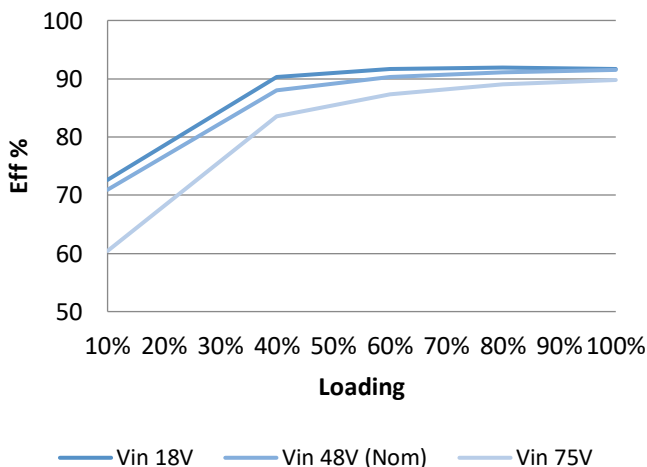
**AM60EW-2412DZ Loading vs. Efficiency**



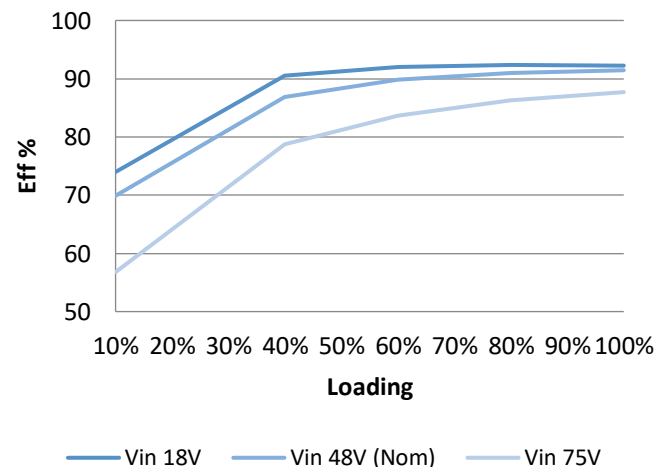
**AM60EW-2415DZ Loading vs. Efficiency**



**AM60EW-4812DZ Loading vs. Efficiency**



**AM60EW-4815DZ Loading vs. Efficiency**



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