

## Series AM2D-RZ

### 2 Watt | DC-DC Converter

#### FEATURES:



- RoHS Compliant
- High Efficiency up to 89%
- Low Ripple and Noise
- 7 pin SIP Package
- Operating Temperature -40°C to +85°C
- Pin Compatible with Multiple Manufacturers
- Input / Output Isolation 1000, 3000 VDC
- Non-Conductive Plastic Case

#### Models Single output



| Model            | Input Voltage (V) | Output Voltage (V) | Output Current Max (mA) | Isolation (VDC) | Input Current Full Load   No Load (mA) |    | Max Capacitive Load (uF) | Efficiency (%) |
|------------------|-------------------|--------------------|-------------------------|-----------------|----------------------------------------|----|--------------------------|----------------|
| AM2D-0505S-RZ    | 4.5-5.5           | 5                  | 400                     | 1000            | 494                                    | 50 | 220                      | 81             |
| AM2D-0509S-RZ    | 4.5-5.5           | 9                  | 222                     | 1000            | 471                                    | 50 | 220                      | 85             |
| AM2D-0512S-RZ    | 4.5-5.5           | 12                 | 166                     | 1000            | 471                                    | 50 | 100                      | 85             |
| AM2D-0515S-RZ    | 4.5-5.5           | 15                 | 133                     | 1000            | 465                                    | 50 | 100                      | 86             |
| AM2D-1205S-RZ    | 10.8-13.2         | 5                  | 400                     | 1000            | 198                                    | 40 | 220                      | 84             |
| AM2D-1209S-RZ    | 10.8-13.2         | 9                  | 222                     | 1000            | 194                                    | 40 | 220                      | 86             |
| AM2D-1212S-RZ    | 10.8-13.2         | 12                 | 166                     | 1000            | 189                                    | 40 | 100                      | 88             |
| AM2D-1215S-RZ    | 10.8-13.2         | 15                 | 133                     | 1000            | 189                                    | 40 | 100                      | 88             |
| AM2D-1505S-RZ    | 13.5-16.5         | 5                  | 400                     | 1000            | 157                                    | 30 | 220                      | 85             |
| AM2D-1509S-RZ    | 13.5-16.5         | 9                  | 222                     | 1000            | 153                                    | 30 | 220                      | 87             |
| AM2D-1512S-RZ    | 13.5-16.5         | 12                 | 166                     | 1000            | 153                                    | 30 | 100                      | 87             |
| AM2D-1515S-RZ    | 13.5-16.5         | 15                 | 133                     | 1000            | 152                                    | 30 | 100                      | 88             |
| AM2D-2405S-RZ    | 21.6-26.4         | 5                  | 400                     | 1000            | 102                                    | 20 | 220                      | 82             |
| AM2D-2409S-RZ    | 21.6-26.4         | 9                  | 222                     | 1000            | 99                                     | 20 | 220                      | 84             |
| AM2D-2412S-RZ    | 21.6-26.4         | 12                 | 166                     | 1000            | 97                                     | 20 | 100                      | 86             |
| AM2D-2415S-RZ    | 21.6-26.4         | 15                 | 133                     | 1000            | 96                                     | 20 | 100                      | 87             |
| AM2D-0505SH30-RZ | 4.5-5.5           | 5                  | 400                     | 3000            | 494                                    | 50 | 220                      | 81             |
| AM2D-0509SH30-RZ | 4.5-5.5           | 9                  | 222                     | 3000            | 471                                    | 50 | 220                      | 85             |
| AM2D-0512SH30-RZ | 4.5-5.5           | 12                 | 166                     | 3000            | 471                                    | 50 | 100                      | 85             |
| AM2D-0515SH30-RZ | 4.5-5.5           | 15                 | 133                     | 3000            | 465                                    | 50 | 100                      | 86             |
| AM2D-1205SH30-RZ | 10.8-13.2         | 5                  | 400                     | 3000            | 198                                    | 40 | 220                      | 84             |
| AM2D-1209SH30-RZ | 10.8-13.2         | 9                  | 222                     | 3000            | 194                                    | 40 | 220                      | 86             |
| AM2D-1212SH30-RZ | 10.8-13.2         | 12                 | 166                     | 3000            | 189                                    | 40 | 100                      | 88             |
| AM2D-1215SH30-RZ | 10.8-13.2         | 15                 | 133                     | 3000            | 189                                    | 40 | 100                      | 88             |
| AM2D-1505SH30-RZ | 13.5-16.5         | 5                  | 400                     | 3000            | 157                                    | 30 | 220                      | 85             |
| AM2D-1509SH30-RZ | 13.5-16.5         | 9                  | 222                     | 3000            | 153                                    | 30 | 220                      | 87             |
| AM2D-1512SH30-RZ | 13.5-16.5         | 12                 | 166                     | 3000            | 153                                    | 30 | 100                      | 87             |
| AM2D-1515SH30-RZ | 13.5-16.5         | 15                 | 133                     | 3000            | 152                                    | 30 | 100                      | 88             |
| AM2D-2405SH30-RZ | 21.6-26.4         | 5                  | 400                     | 3000            | 102                                    | 20 | 220                      | 82             |
| AM2D-2409SH30-RZ | 21.6-26.4         | 9                  | 222                     | 3000            | 99                                     | 20 | 220                      | 84             |
| AM2D-2412SH30-RZ | 21.6-26.4         | 12                 | 166                     | 3000            | 97                                     | 20 | 100                      | 86             |
| AM2D-2415SH30-RZ | 21.6-26.4         | 15                 | 133                     | 3000            | 96                                     | 20 | 100                      | 87             |

### Models

#### Dual output

| Model            | Input Voltage (V) | Output Voltage (V) | Output Current Max (mA) | Isolation (VDC) | Input Current Full Load   No Load (mA) |    | Max Capacitive Load (uF) | Efficiency (%) |
|------------------|-------------------|--------------------|-------------------------|-----------------|----------------------------------------|----|--------------------------|----------------|
| AM2D-0505D-RZ    | 4.5-5.5           | ±5                 | ±200                    | 1000            | 488                                    | 50 | ±100                     | 82             |
| AM2D-0509D-RZ    | 4.5-5.5           | ±9                 | ±111                    | 1000            | 471                                    | 50 | ±100                     | 85             |
| AM2D-0512D-RZ    | 4.5-5.5           | ±12                | ±83                     | 1000            | 465                                    | 50 | ±47                      | 86             |
| AM2D-0515D-RZ    | 4.5-5.5           | ±15                | ±66                     | 1000            | 460                                    | 50 | ±47                      | 87             |
| AM2D-1205D-RZ    | 10.8-13.2         | ±5                 | ±200                    | 1000            | 200                                    | 40 | ±100                     | 84             |
| AM2D-1209D-RZ    | 10.8-13.2         | ±9                 | ±111                    | 1000            | 189                                    | 40 | ±100                     | 88             |
| AM2D-1212D-RZ    | 10.8-13.2         | ±12                | ±83                     | 1000            | 187                                    | 40 | ±47                      | 89             |
| AM2D-1215D-RZ    | 10.8-13.2         | ±15                | ±66                     | 1000            | 187                                    | 40 | ±47                      | 89             |
| AM2D-1505D-RZ    | 13.5-16.5         | ±5                 | ±200                    | 1000            | 157                                    | 30 | ±100                     | 85             |
| AM2D-1509D-RZ    | 13.5-16.5         | ±9                 | ±111                    | 1000            | 152                                    | 30 | ±100                     | 88             |
| AM2D-1512D-RZ    | 13.5-16.5         | ±12                | ±83                     | 1000            | 152                                    | 30 | ±47                      | 88             |
| AM2D-1515D-RZ    | 13.5-16.5         | ±15                | ±66                     | 1000            | 152                                    | 30 | ±47                      | 88             |
| AM2D-2405D-RZ    | 21.6-26.4         | ±5                 | ±200                    | 1000            | 102                                    | 20 | ±100                     | 82             |
| AM2D-2409D-RZ    | 21.6-26.4         | ±9                 | ±111                    | 1000            | 98                                     | 20 | ±100                     | 85             |
| AM2D-2412D-RZ    | 21.6-26.4         | ±12                | ±83                     | 1000            | 97                                     | 20 | ±47                      | 86             |
| AM2D-2415D-RZ    | 21.6-26.4         | ±15                | ±66                     | 1000            | 96                                     | 20 | ±47                      | 87             |
| AM2D-0505DH30-RZ | 4.5-5.5           | ±5                 | ±200                    | 3000            | 488                                    | 50 | ±100                     | 82             |
| AM2D-0509DH30-RZ | 4.5-5.5           | ±9                 | ±111                    | 3000            | 471                                    | 50 | ±100                     | 85             |
| AM2D-0512DH30-RZ | 4.5-5.5           | ±12                | ±83                     | 3000            | 465                                    | 50 | ±47                      | 86             |
| AM2D-0515DH30-RZ | 4.5-5.5           | ±15                | ±66                     | 3000            | 460                                    | 50 | ±47                      | 87             |
| AM2D-1205DH30-RZ | 10.8-13.2         | ±5                 | ±200                    | 3000            | 200                                    | 40 | ±100                     | 84             |
| AM2D-1209DH30-RZ | 10.8-13.2         | ±9                 | ±111                    | 3000            | 189                                    | 40 | ±100                     | 88             |
| AM2D-1212DH30-RZ | 10.8-13.2         | ±12                | ±83                     | 3000            | 187                                    | 40 | ±47                      | 89             |
| AM2D-1215DH30-RZ | 10.8-13.2         | ±15                | ±66                     | 3000            | 187                                    | 40 | ±47                      | 89             |
| AM2D-1505DH30-RZ | 13.5-16.5         | ±5                 | ±200                    | 3000            | 157                                    | 30 | ±100                     | 85             |
| AM2D-1509DH30-RZ | 13.5-16.5         | ±9                 | ±111                    | 3000            | 152                                    | 30 | ±100                     | 88             |
| AM2D-1512DH30-RZ | 13.5-16.5         | ±12                | ±83                     | 3000            | 152                                    | 30 | ±47                      | 88             |
| AM2D-1515DH30-RZ | 13.5-16.5         | ±15                | ±66                     | 3000            | 152                                    | 30 | ±47                      | 88             |
| AM2D-2405DH30-RZ | 21.6-26.4         | ±5                 | ±200                    | 3000            | 102                                    | 20 | ±100                     | 82             |
| AM2D-2409DH30-RZ | 21.6-26.4         | ±9                 | ±111                    | 3000            | 98                                     | 20 | ±100                     | 85             |
| AM2D-2412DH30-RZ | 21.6-26.4         | ±12                | ±83                     | 3000            | 97                                     | 20 | ±47                      | 86             |
| AM2D-2415DH30-RZ | 21.6-26.4         | ±15                | ±66                     | 3000            | 96                                     | 20 | ±47                      | 87             |

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           | 5         | 4.5-5.5   |         | VDC   |
|                         | 12        | 10.8-13.2 |         | VDC   |
|                         | 15        | 13.5-16.5 |         | VDC   |
|                         | 24        | 21.6-26.4 |         | VDC   |
| Filter                  | Capacitor |           |         |       |
| Absolute Maximum Rating | 5 Vin     |           | 9       | VDC   |
|                         | 12 Vin    |           | 18      | VDC   |
|                         | 15 Vin    |           | 20      | VDC   |
|                         | 24 Vin    |           | 30      | VDC   |
| Peak Input Voltage time |           |           | 100     | ms    |
| No Load Input Current   |           |           | 50      | mA    |

### Isolation Specifications

| Parameters         | Conditions | Typical | Maximum    | Units |
|--------------------|------------|---------|------------|-------|
| Tested I/O voltage | 60sec      |         | 1000, 3000 | VDC   |
| Resistance         |            | >1000   |            | MOhm  |
| Capacitance        |            | 60      |            | pF    |

### Output Specifications

| Parameters              | Conditions                      | Typical  | Maximum | Units    |
|-------------------------|---------------------------------|----------|---------|----------|
| Voltage accuracy        |                                 | -4 to +2 |         | %        |
| Line voltage regulation | For 1.0% of Vin                 | ±1.2     |         | % of Vin |
| Load voltage regulation | Load 10~100%, 5Vin/5Vout models | 6        |         | %        |
|                         | Load 10~100%, other models      | 5        |         | %        |
| Temperature coefficient |                                 | ±0.02    |         | %/°C     |
| Ripple & Noise *        | 20MHz Bandwidth                 | 50       |         | mVp-p    |
| Minimum Load Current ** |                                 | 10       |         | % of Max |

\* Measured with a 1μF ceramic capacitor.

\*\* Operating the converter below the minimum load current will not damage the converter, but the specifications may not be meet.

### General Specifications

| Parameters                    | Conditions                                              | Typical     | Maximum | Units |
|-------------------------------|---------------------------------------------------------|-------------|---------|-------|
| Switching frequency           | 100% load                                               | 70          |         | KHz   |
| Operating temperature         |                                                         | -40 to +85  |         | °C    |
| Storage temperature           |                                                         | -40 to +125 |         | °C    |
| Maximum case temperature      |                                                         |             | 100     | °C    |
| Cooling                       | Free Air Convection                                     |             |         |       |
| Humidity                      |                                                         |             | 95      | % RH  |
| Case material                 | Plastic UL94V-0                                         |             |         |       |
| Weight                        |                                                         | 2.8         |         | g     |
| Dimensions (L x W x H)        | 0.76 x 0.28 x 0.39 inch    19.50 x 7.20 x 10.00 mm      |             |         |       |
| MTBF                          | >1.9 Mhrs (MIL-HDBK -217F, Ground Benign, t=+25°C)hours |             |         |       |
| Maximum soldering temperature | 1.5mm from case for 10 sec                              |             | 260     | °C    |

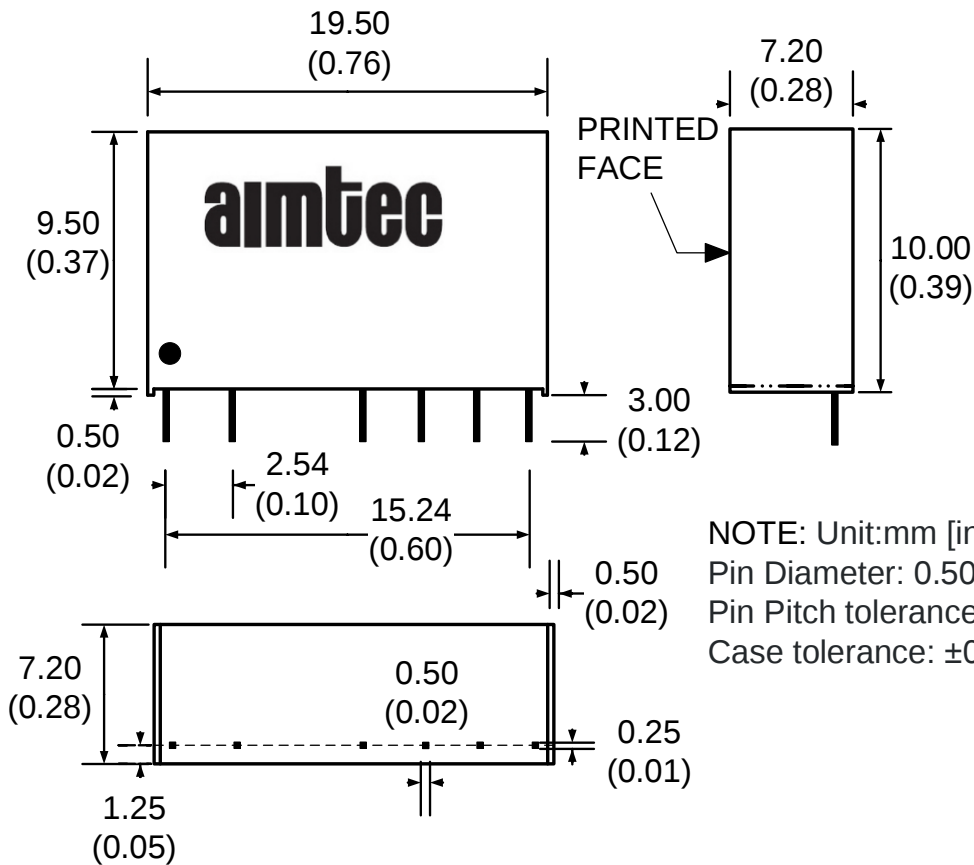
### Safety Specifications

| Parameters      |                                                             |
|-----------------|-------------------------------------------------------------|
| Agency Approval | CE                                                          |
| Standards       | EN55032, Class B                                            |
|                 | IEC61000-4-2, Criteria A                                    |
|                 | IEC61000-4-3, Criteria A                                    |
|                 | IEC61000-4-4, Criteria A (external 220uF/100V cap required) |
|                 | IEC61000-4-6, Criteria A                                    |
|                 | IEC61000-4-8, Criteria A                                    |

### Pin Out Specifications

| Pin | 1000 VDC   |            | 3000VDC   |           |
|-----|------------|------------|-----------|-----------|
|     | Single     | Dual       | Single    | Dual      |
| 1   | + V Input  | + V Input  | + V Input | + V Input |
| 2   | - V Input  | - V Input  | - V Input | - V Input |
| 4   | - V Output | - V Output | No pin    | No pin    |
| 5   | No pin     | Common     | -V Output | -V Output |
| 6   | + V Output | + V Output | No pin    | Common    |
| 7   | No pin     | No pin     | +V Output | +V Output |

## Dimensions



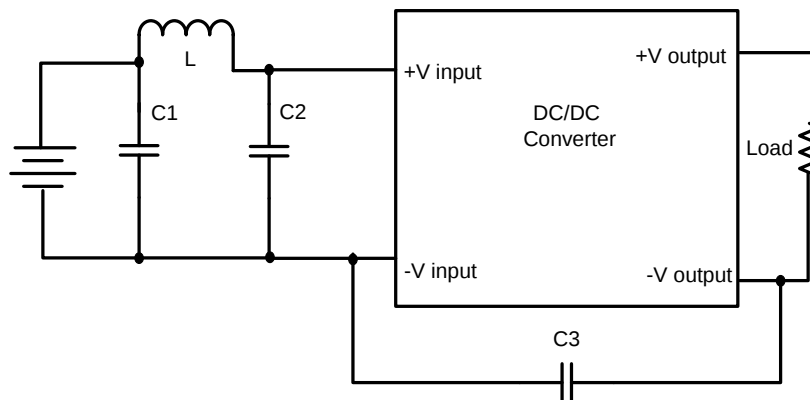
NOTE: Unit:mm [inch]

Pin Diameter:  $0.50 \pm 0.05\text{mm}$  [ $0.02 \pm 0.002$  inch]

Pin Pitch tolerance:  $\pm 0.35\text{mm}$  [ $\pm 0.014$  inch]

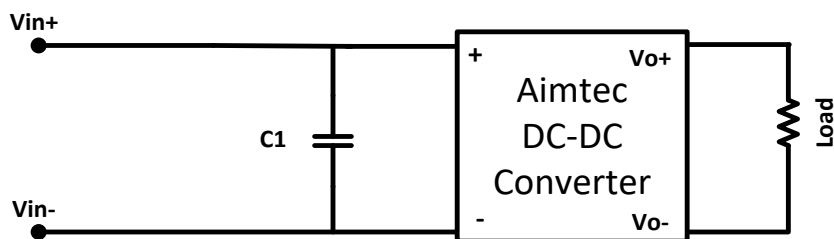
Case tolerance:  $\pm 0.50\text{mm}$  [  $\pm 0.02$  inch]

## Application Circuit, & Conducted Emissions



| Input Voltage (VDC) | C1         | L    | C2         | C3        |
|---------------------|------------|------|------------|-----------|
| 5                   | 2.2uF/100V | 18uH | N/A        | N/A       |
| 12                  | 2.2uF/100V | 18uH | N/A        | N/A       |
| 15                  | 2.2uF/100V | 18uH | N/A        | N/A       |
| 24                  | 2.2uF/100V | 18uH | 2.2uF/100V | 470pF/2KV |

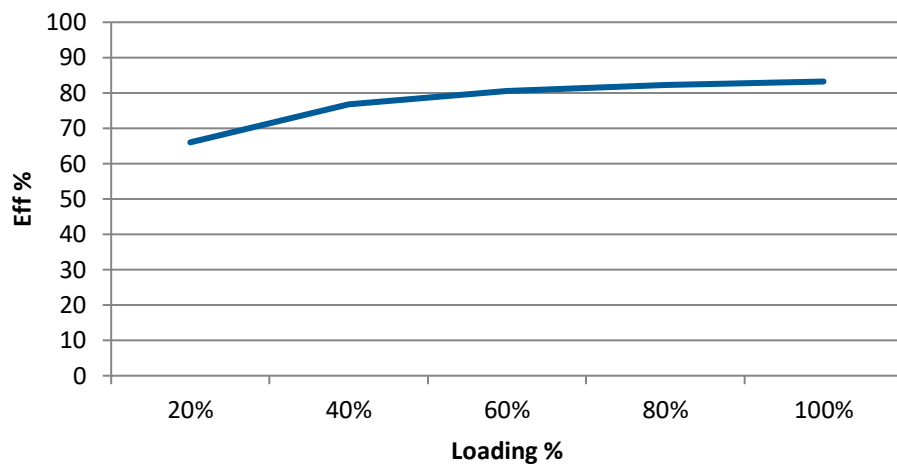
## EFT



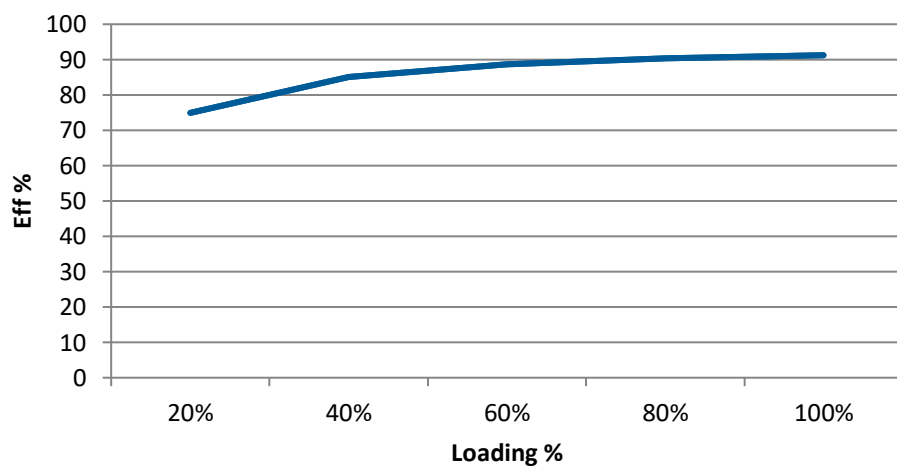
| Input Voltage (VDC) | C1         |
|---------------------|------------|
| 5                   | 220uF/100V |
| 12                  | 220uF/100V |
| 15                  | 220uF/100V |
| 24                  | 220uF/100V |

## Typical Efficiency Chart Examples

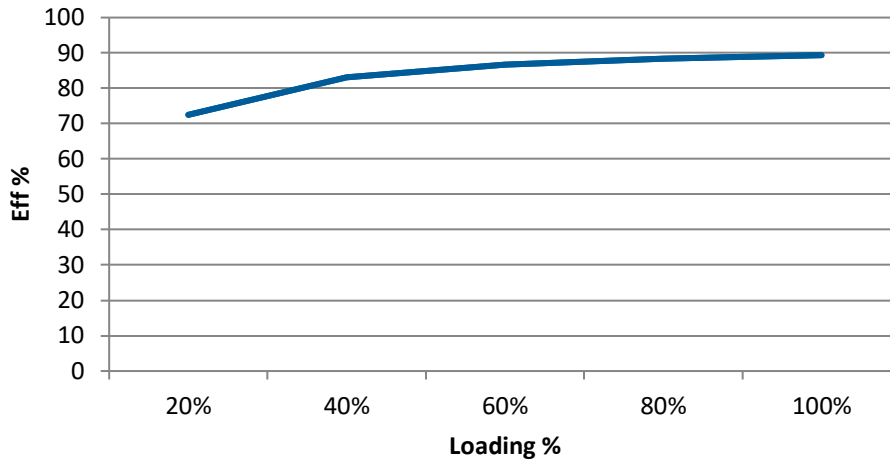
**AM2D-0505S-RZ Efficiency vs. Loading**



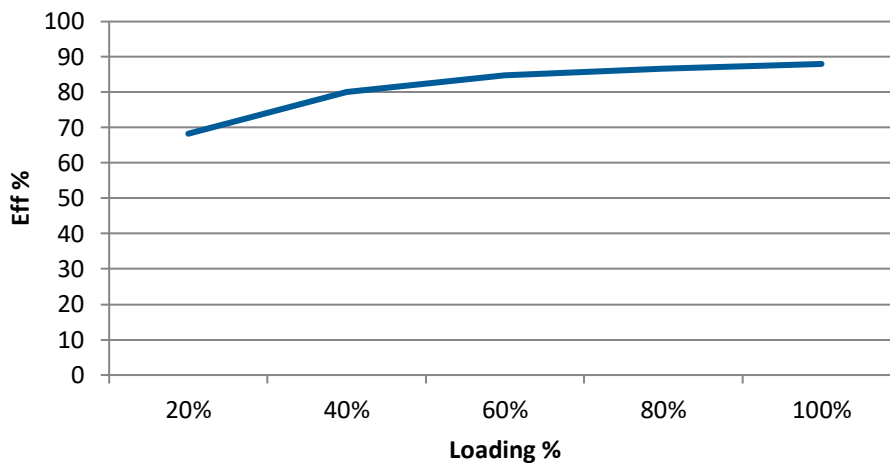
**AM2D-1215S-RZ Efficiency vs. Loading**



**AM2D-1509S-RZ Efficiency vs. Loading**



**AM2D-2412S-RZ Efficiency vs. Loading**



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