

**FEATURES:**

- Single, Dual, & Dual Separated Models
- SMD Package
- Low ripple and noise
- High efficiency up to 83%
- Operating temperature -40°C to + 85°C
- Input / Output Isolation 1000 & 3000VDC
- Pin compatible with multiple manufacturers
- RoHS compliant

### Models

#### Single output



| Model            | Input Voltage (V) | Output Voltage (V) | Output Current Max   Min (mA) |    | Isolation (VDC) | Efficiency (%) |
|------------------|-------------------|--------------------|-------------------------------|----|-----------------|----------------|
| AM1L-0303S-NZ    | 3.0-3.6           | 3.3                | 304                           | 30 | 1000            | 70             |
| AM1L-0305S-NZ    | 3.0-3.6           | 5                  | 200                           | 20 | 1000            | 71             |
| AM1L-0505S-NZ    | 4.5-5.5           | 5                  | 200                           | 20 | 1000            | 78             |
| AM1L-0509S-NZ    | 4.5-5.5           | 9                  | 111                           | 11 | 1000            | 74             |
| AM1L-0512S-NZ    | 4.5-5.5           | 12                 | 84                            | 8  | 1000            | 77             |
| AM1L-0515S-NZ    | 4.5-5.5           | 15                 | 67                            | 6  | 1000            | 78             |
| AM1L-1205S-NZ    | 10.8-13.2         | 5                  | 200                           | 20 | 1000            | 73             |
| AM1L-1209S-NZ    | 10.8-13.2         | 9                  | 111                           | 11 | 1000            | 75             |
| AM1L-1212S-NZ    | 10.8-13.2         | 12                 | 84                            | 8  | 1000            | 79             |
| AM1L-1215S-NZ    | 10.8-13.2         | 15                 | 67                            | 6  | 1000            | 80             |
| AM1L-2405S-NZ    | 21.6-26.4         | 5                  | 200                           | 20 | 1000            | 72             |
|                  |                   |                    |                               |    |                 |                |
| AM1L-0505SH30-NZ | 4.5-5.5           | 5                  | 200                           | 20 | 3000            | 70             |
| AM1L-0509SH30-NZ | 4.5-5.5           | 9                  | 111                           | 11 | 3000            | 75             |
| AM1L-0512SH30-NZ | 4.5-5.5           | 12                 | 84                            | 8  | 3000            | 78             |
| AM1L-0515SH30-NZ | 4.5-5.5           | 15                 | 67                            | 6  | 3000            | 80             |
| AM1L-1205SH30-NZ | 10.8-13.2         | 5                  | 200                           | 20 | 3000            | 72             |
| AM1L-1212SH30-NZ | 10.8-13.2         | 12                 | 84                            | 8  | 3000            | 79             |
| AM1L-1215SH30-NZ | 10.8-13.2         | 15                 | 67                            | 6  | 3000            | 81             |

### Models

#### Dual output

| Model            | Input Voltage (V) | Output Voltage (V) | Output Current Max   Min (mA) |     | Isolation (VDC) | Efficiency (%) |
|------------------|-------------------|--------------------|-------------------------------|-----|-----------------|----------------|
| AM1L-0509D-NZ    | 4.5-5.5           | ±9                 | ±56                           | ±6  | 1000            | 78             |
| AM1L-0512D-NZ    | 4.5-5.5           | ±12                | ±42                           | ±4  | 1000            | 79             |
| AM1L-0515D-NZ    | 4.5-5.5           | ±15                | ±33                           | ±3  | 1000            | 78             |
| AM1L-1215D-NZ    | 10.8-13.2         | ±15                | ±33                           | ±3  | 1000            | 77             |
|                  |                   |                    |                               |     |                 |                |
| AM1L-0505DH30-NZ | 4.5-5.5           | ±5                 | ±100                          | ±10 | 3000            | 72             |
| AM1L-0509DH30-NZ | 4.5-5.5           | ±9                 | ±56                           | ±6  | 3000            | 75             |
| AM1L-0512DH30-NZ | 4.5-5.5           | ±12                | ±42                           | ±4  | 3000            | 78             |
| AM1L-0515DH30-NZ | 4.5-5.5           | ±15                | ±33                           | ±3  | 3000            | 79             |
| AM1L-1212DH30-NZ | 10.8-13.2         | ±12                | ±42                           | ±4  | 3000            | 78             |
| AM1L-1215DH30-NZ | 10.8-13.2         | ±15                | ±33                           | ±3  | 3000            | 79             |

### Models

#### Dual Separated Output

| Model           | Input Voltage (V) | Output Voltage (V) | Output Current Max   Min (mA) |       | Isolation (VDC) | Efficiency (%) |
|-----------------|-------------------|--------------------|-------------------------------|-------|-----------------|----------------|
| AM1L-050505D-NZ | 4.5-5.5           | 5/5                | 100/100                       | 10/10 | 1000            | 70             |
| AM1L-121212D-NZ | 10.8-13.2         | 12/12              | 42/42                         | 4/4   | 1000            | 78             |

NOTE 1: Add suffix "TR" to a part number when ordering in tape and reel package

NOTE 2: 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 | 3         | 3.0-3.6   |         | VDC   |
|               | 5         | 4.5-5.5   |         |       |
|               | 12        | 10.8-13.2 |         |       |
|               | 24        | 21.6-26.4 |         |       |
| Filter        | Capacitor |           |         |       |

### Isolation Specifications

| Parameters                      | Conditions | Typical | Rated       | Units |
|---------------------------------|------------|---------|-------------|-------|
| Tested I/O voltage              | 60 sec     |         | 1000 & 3000 | VDC   |
| Tested V1 output/ V2 output     | 60 sec     | 1000    |             | VDC   |
| Capacitance V input/V output    | 500Vdc     | 60      |             | pF    |
| Capacitance V1 output/V2 output | 500Vdc     | 60      |             | pF    |
| Resistance                      | 500Vdc     | > 1000  |             | MOhm  |

### Output Specifications

| Parameters                               | Conditions              | Typical | Maximum | Units  |
|------------------------------------------|-------------------------|---------|---------|--------|
| Voltage accuracy                         | See the tolerance graph | ±5      |         | %      |
| Voltage balance                          | Dual Output             | ±2      |         | %      |
| Short Circuit protection                 | Momentary (1sec)        |         |         |        |
| Line voltage regulation                  | For 1.0% of Vin         | ±1.2    |         | %      |
| Load voltage regulation (Single)         | Load 10 – 100%          | 10      |         | %      |
| Load voltage regulation (Dual)           | Load 10 – 100%          | 10      |         | %      |
| Load voltage regulation (Dual Separated) | Load 10 – 100%          | 12.8    |         | %      |
| Temperature coefficient                  |                         | ±0.03   |         | %/°C   |
| Ripple & Noise                           | At 20MHz Bandwidth      | 75      | 100     | mV p-p |

NOTE: If the operating output current is less than 10% of maximum it is recommended to install a load resistor in parallel with the load to ensure the actual load current meets the minimum load current requirement.

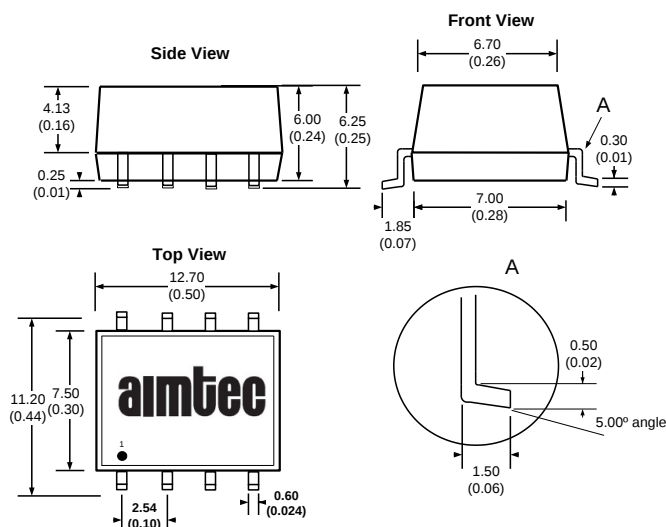
### General Specifications

| Parameters             | Conditions                                                                      | Typical                 | Maximum                 | Units |
|------------------------|---------------------------------------------------------------------------------|-------------------------|-------------------------|-------|
| Switching frequency    | 100% load                                                                       | 100                     |                         | KHz   |
| Max Case temperature   |                                                                                 |                         | +95                     | °C    |
| Operating temperature  | Without derating                                                                | -40 to +85              |                         | °C    |
| Storage temperature    |                                                                                 | -55 to +125             |                         | °C    |
| Cooling                | Free air convection                                                             |                         |                         |       |
| Humidity               |                                                                                 |                         | 95                      | %     |
| Case material          | Plastic UL94-VO                                                                 |                         |                         |       |
| Weight                 |                                                                                 | 1.5                     |                         | g     |
|                        | Dual Separated                                                                  | 2.1                     |                         |       |
| Dimensions (L x W x H) | Single 1000VDC                                                                  | 0.50 x 0.44 x 0.25 inch | 12.70 x 11.20 x 6.25 mm |       |
|                        | Dual 1000VDC                                                                    | 0.60 x 0.44 x 0.25 inch | 15.24 x 11.20 x 6.25 mm |       |
|                        | Dual Separated 1000VDC                                                          | 0.70 x 0.70 x 0.24 inch | 17.78 x 17.78 x 6.00 mm |       |
|                        | Single and Dual 3000VDC                                                         | 0.6 x 0.44 x 0.26 inch  | 15.24 x 11.20 x 6.50 mm |       |
| MTBF                   | >980 000 hrs single, 1 000 000hrs dual (MIL-HDBK -217F, Ground Benign, t=+25°C) |                         |                         |       |

### Safety Specifications

| Parameters       |                                                     |
|------------------|-----------------------------------------------------|
| Agency approvals | cULus (without 24V models and dual separate models) |
|                  | CE (for 5 and 12 Vin single models)                 |
| Standards        | IEC/UL 60950-1                                      |

## Dimensions Single 1000VDC



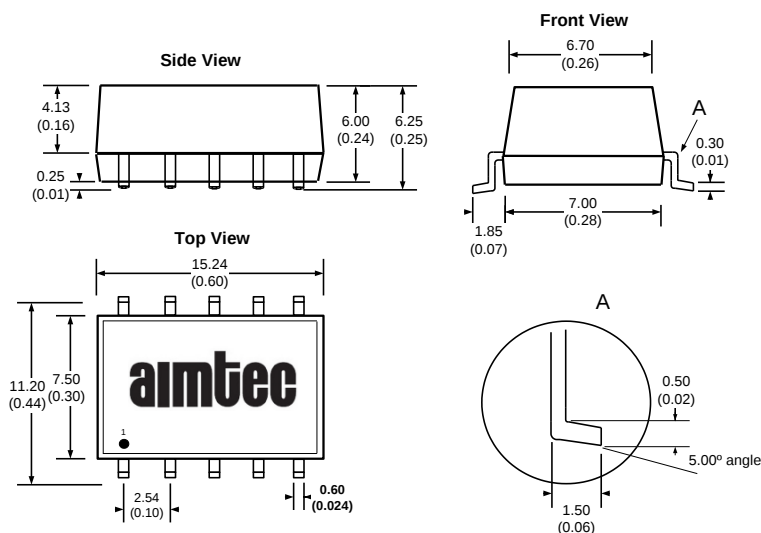
All dimensions are in mm (inch)  
All Pins are on a 2.54mm (0.10inch) pitch  
with tolerance of  $\pm 0.25\text{mm}$  (0.01inch)

## Pin Out Specifications

| Pin | Single     |
|-----|------------|
| 1   | - V Input  |
| 2   | + V Input  |
| 3   | N. C.      |
| 4   | - V Output |
| 5   | +V Output  |
| 6   | N.C.       |
| 7   | N.C.       |
| 8   | N.C.       |

N.C: Not Connected

## Dual 1000VDC



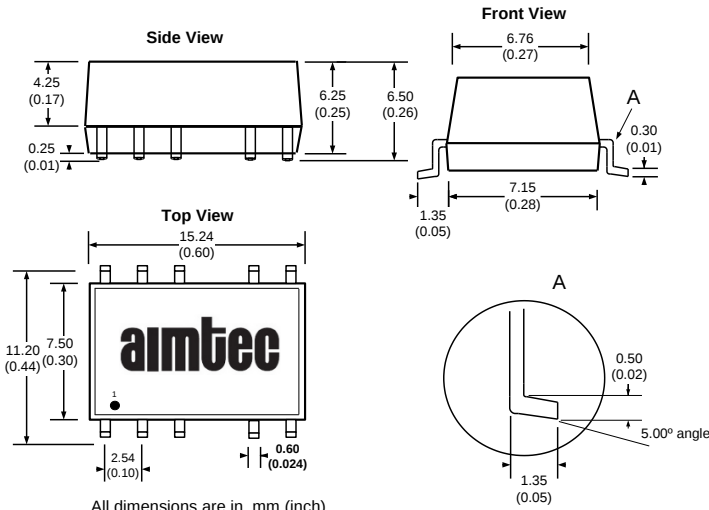
All dimensions are in mm (inch)  
All Pins are on a 2.54mm (0.10inch) pitch  
with tolerance of  $\pm 0.25\text{mm}$  (0.01inch)

| Pin | Dual      |
|-----|-----------|
| 1   | - V Input |
| 2   | + V Input |
| 3   | N. C.     |
| 4   | Common    |
| 5   | -V Output |
| 6   | N.C.      |
| 7   | +V Output |
| 8   | N.C.      |
| 9   | N.C.      |
| 10  | N.C.      |

### Dimensions Single and Dual 3000VDC

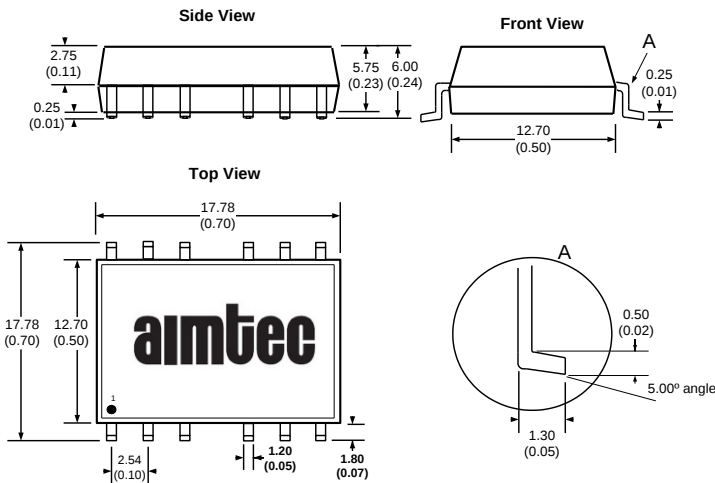
### Pin Out Specifications

| Pin | Single    | Dual      |
|-----|-----------|-----------|
| 1   | - V Input | - V Input |
| 2   | + V Input | + V Input |
| 3   | N.C.      | N.C.      |
| 4   | Omitted   | Omitted   |
| 5   | -V Output | Common    |
| 6   | N.C.      | -V Output |
| 7   | N.C.      | N.C.      |
| 8   | +V Output | +V Output |
| 9   | Omitted   | Omitted   |
| 10  | N.C.      | N.C.      |
| 11  | N.C.      | N.C.      |
| 12  | N.C.      | N.C.      |



All dimensions are in mm (inch)  
All Pins are on a 2.54mm (0.10inch) pitch  
with tolerance of  $\pm 0.25$ mm (0.01inch)

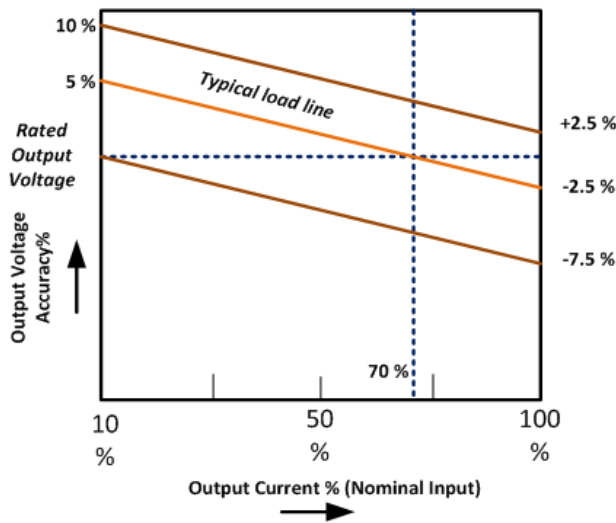
### Dual Separated 1000VDC



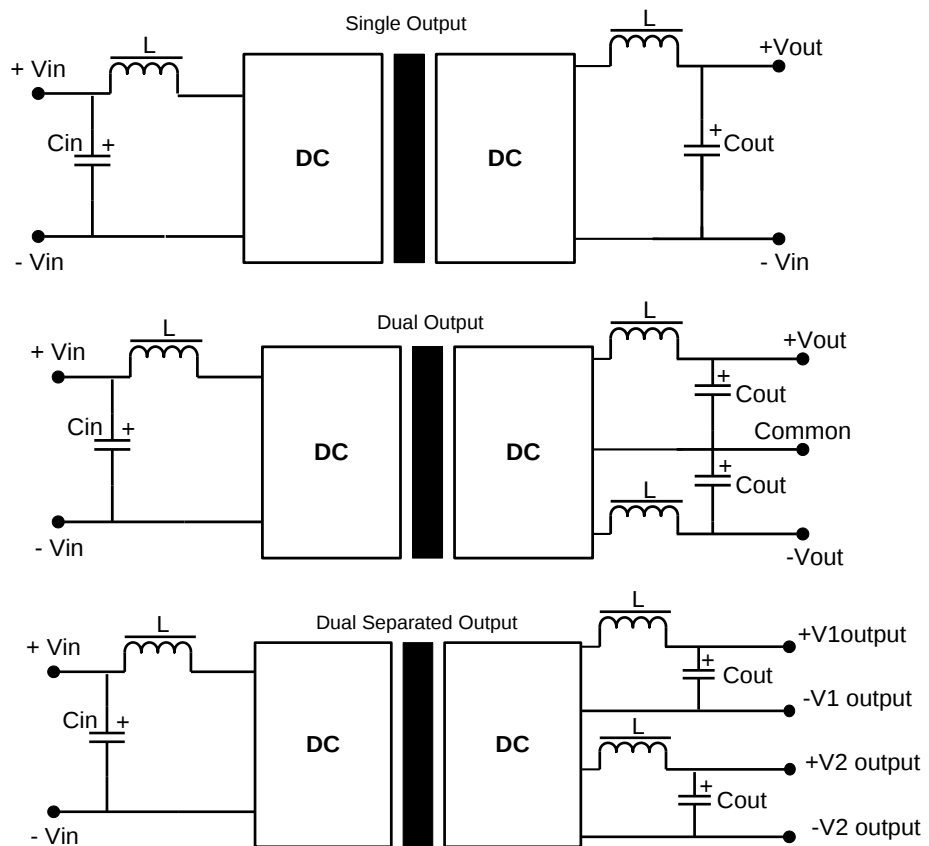
All dimensions are in mm (inch)  
All Pins are on a 2.54mm (0.10inch) pitch  
with tolerance of  $\pm 0.25$ mm (0.01inch)

| Pin | Dual Separated |
|-----|----------------|
| 1   | - V Input      |
| 2   | + V Input      |
| 3   | N.C.           |
| 5   | - V1 Output    |
| 6   | .+V1 Output    |
| 7   | N.C.           |
| 8   | N.C.           |
| 9   | .+V2 Output    |
| 10  | - V2 Output    |
| 12  | N.C.           |
| 13  | N.C.           |
| 14  | N.C.           |

## Tolerance Graph



## Recommended Filter Circuit



If it is required to decrease the input/output ripple, an “LC” filter network can be installed on the input and output of the converter (see above).

It should be noted that the inductance and the resonant frequency of the “LC” filtering network should differ from the DC/DC converter switching frequency to avoid mutual interference.

The capacitance of the output filter capacitor must not exceed the values in the Table below to avoid startup problems and ensure safe and reliable operation.

**It's not recommended to connect any external capacitor in the application field when output loading is less than 0.5 watt.**

## External Capacitor Tables

### Input Capacitor (Cin)

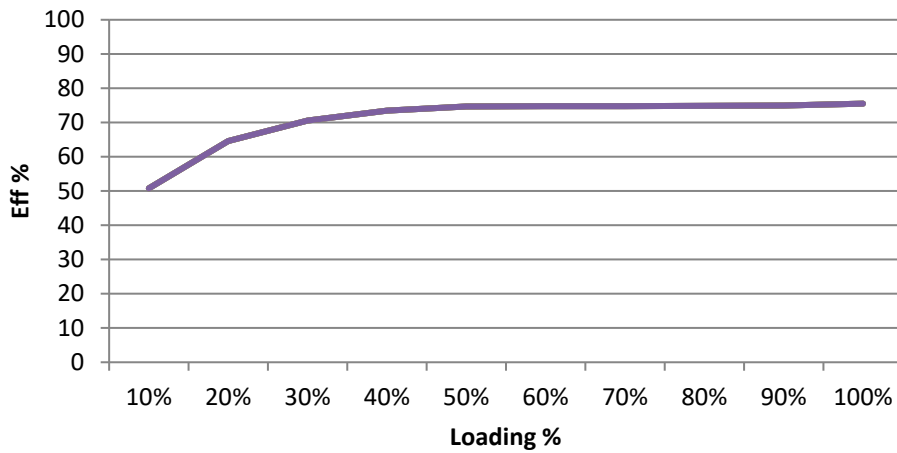
| Vin (VDC) | Cin (uF) |
|-----------|----------|
| 5         | 4.7      |
| 12        | 2.2      |

### Output Capacitor (Cout)

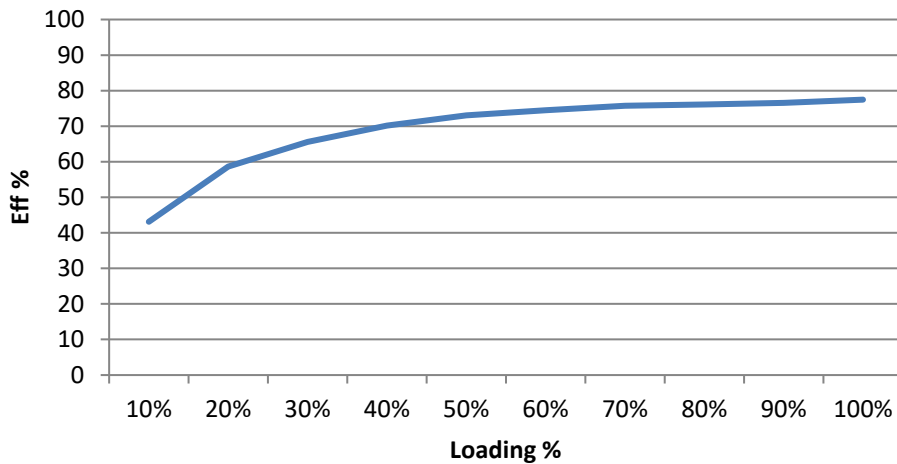
| Single Vout (VDC) | Cout (uF) | Dual Vout (Vdc) | Cout (uF) | Dual Separated Vout (Vdc) | Cout (uF) |
|-------------------|-----------|-----------------|-----------|---------------------------|-----------|
| 5                 | 10        | ±5              | 4.7       | 5/5                       | 4.7       |
| 9                 | 4.7       | ±9              | 2.2       | 9/9                       | 2.2       |
| 12                | 2.2       | ±12             | 1         | 12/12                     | 1         |
| 15                | 1         | ±15             | 0.47      | 15/15                     | 0.47      |

Typical Efficiency vs. Loading

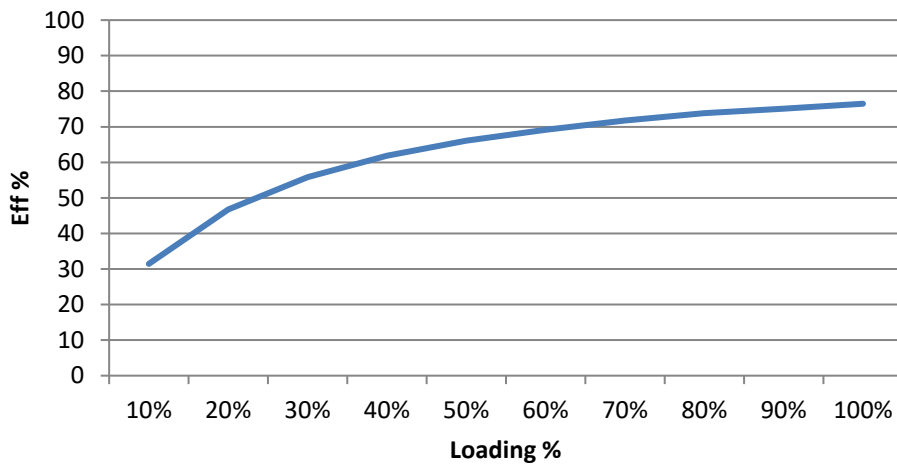
**AM1L-0303S-NZ Efficiency vs. Loading**



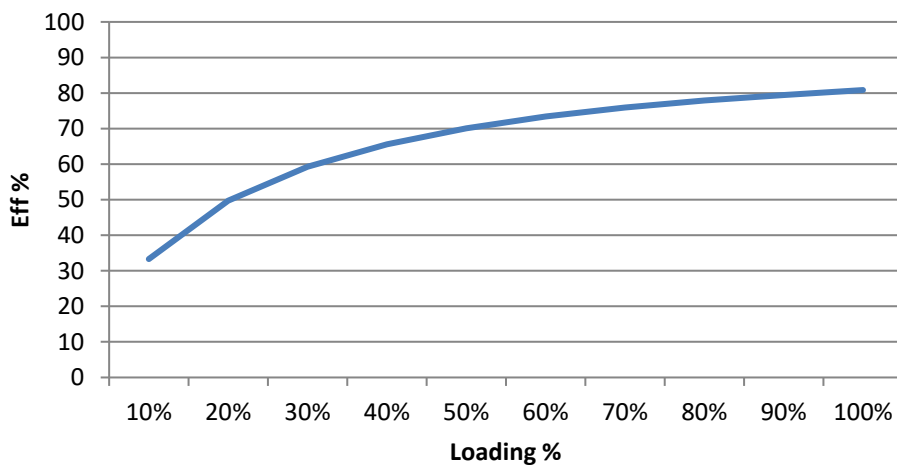
**AM1L-0505S-NZ Efficiency vs. Loading**



### AM1L-1212S-NZ Efficiency vs. Loading



### AM1L-2424S-NZ Efficiency vs. Loading



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