

# KAW-EL SERIES

30W WIDE INPUT RANGE

# DANUBE

## FEATURES

- 30W DIL PACKAGE
- INDUSTRY STANDARD PACKAGE
- 9-18V, 18-36V, 36-72V, 9-36V, 18-72V WIDE INPUT RANGE
- 100% BURN IN
- HIGH EFFICIENCY
- UL 94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT



| OUTPUT SPECIFICATIONS                 |                  | INPUT SPECIFICATIONS           |                           |
|---------------------------------------|------------------|--------------------------------|---------------------------|
| Voltage Set-point Accuracy            |                  | Input Voltage Range            | 2:1 or 4:1 Input Range    |
| Single Output                         | +/-2% max.       | Input Filter                   | Pi Network                |
| Dual Output                           | +/-2% max.       | Protection                     | Fuse Recommended          |
| Over Voltage Protection               | Built-in         | GENERAL SPECIFICATIONS         |                           |
| Temperature Coefficient               | +/-0.05/°C       | Efficiency                     | 78% min.                  |
| Ripple & Noise(20MHz BW) <sup>1</sup> | 150mVp-p max.    | Isolation Voltage <sup>2</sup> | 1500 VDC min.             |
| Line Regulation <sup>3</sup>          |                  | Isolation Resistance           | 10 <sup>9</sup> ohms min. |
| Single                                | +/-0.5% max.     | Isolation Capacitance          | 2500pF max.               |
| Dual                                  | +/-0.5% max.     | Switching Frequency            | 250KHz min.               |
| Load Regulation <sup>4</sup>          |                  | MTBF <sup>5</sup>              | >400,000 Hours            |
| Single                                | +/-0.5% max.     | Weight                         | 90g typ.                  |
| Dual                                  | +/-0.5% max.     | Case Material                  | Six-Side Shielded Case    |
| Minimum load                          | 10% of Full Load | Case Size                      | 50.8mm*50.8mm*11mm        |
| Short Circuit Protection              | Continuous       | Potting Material               | Epoxy(UL 94V-0)           |
| Short Circuit Restart                 | Automatic        | Radiated Emissions             | EN55032 Class A           |
| External Trim Adj. Range              | +/-10%           | ENVIRONMENTAL SPECIFICATIONS   |                           |
| Over Load Protection                  | 150% typ.        | Operating Temperature          | -40 °C to +71 °C          |
| Transient Response <sup>6</sup>       | 500uS max.       | Case Temperature               | +90 °C max.               |
|                                       |                  | Storage Temperature            | -50 °C to +100 °C         |
|                                       |                  | Humidity                       | 95% max.                  |
|                                       |                  | Cooling                        | Free-Air Convection       |

ALL SPECIFICATIONS TYPICAL AT NOMINAL LINE, FULL LOAD, AND 25 °C UNLESS OTHERWISE NOTED.

<sup>1</sup> Measured with 1uF ceramic capacitor connect to the output pins.

<sup>2</sup> For 10 seconds.

<sup>3</sup> High Line to Low Line.

<sup>4</sup> Load Regulation is for output load current change from 50% to 100%.

<sup>5</sup> MIL-HDBK-217F @25 °C, Ground Benign.

<sup>6</sup> 50% Step Load Change.

## ● SELECTION GUIDE(1) 2:1 25W-30W OUTPUT

| MODEL<br>NUMBER | INPUT<br>VOLTAGE<br>(VDC) | OUTPUT<br>VOLTAGE<br>(VDC) | OUTPUT<br>CURRENT<br>(mA) | INPUT <sup>7</sup><br>CURRENT(mA) |            | EFF<br>(%) <sup>8</sup> | CAPACITOR<br>LOAD<br>(Max) |
|-----------------|---------------------------|----------------------------|---------------------------|-----------------------------------|------------|-------------------------|----------------------------|
|                 |                           |                            |                           | FULL<br>LOAD                      | NO<br>LOAD |                         |                            |
| KAWS-1205EL     | 9-18                      | 5                          | 6000                      | 3125                              | 40         | 80                      | 1000uF                     |
| KAWS-1209EL     | 9-18                      | 9                          | 3333                      | 3125                              | 40         | 80                      | 330uF                      |
| KAWS-1212EL     | 9-18                      | 12                         | 2500                      | 3012                              | 40         | 83                      | 220uF                      |
| KAWS-1215EL     | 9-18                      | 15                         | 2000                      | 3012                              | 40         | 83                      | 100uF                      |
| KAWS-1224EL     | 9-18                      | 24                         | 1250                      | 3125                              | 40         | 80                      | 56uF                       |
| KAWD-1205EL     | 9-18                      | +/-5                       | +/-2500                   | 2604                              | 40         | 80                      | +/-470uF                   |
| KAWD-1212EL     | 9-18                      | +/-12                      | +/-1250                   | 3012                              | 40         | 83                      | +/-100uF                   |
| KAWD-1215EL     | 9-18                      | +/-15                      | +/-1000                   | 3012                              | 40         | 83                      | +/-47uF                    |
| KAWS-2403.3EL   | 18-36                     | 3.3                        | 6000                      | 1052                              | 20         | 78                      | 1000uF                     |
| KAWS-2405EL     | 18-36                     | 5                          | 6000                      | 1453                              | 20         | 86                      | 1000uF                     |
| KAWS-2409EL     | 18-36                     | 9                          | 3333                      | 1560                              | 20         | 80                      | 330uF                      |
| KAWS-2412EL     | 18-36                     | 12                         | 2500                      | 1470                              | 20         | 85                      | 220uF                      |
| KAWS-2415EL     | 18-36                     | 15                         | 2000                      | 1470                              | 20         | 85                      | 100uF                      |
| KAWS-2424EL     | 18-36                     | 24                         | 1250                      | 1560                              | 20         | 80                      | 56uF                       |
| KAWD-2405EL     | 18-36                     | +/-5                       | +/-2500                   | 1255                              | 20         | 83                      | +/-470uF                   |
| KAWD-2412EL     | 18-36                     | +/-12                      | +/-1250                   | 1470                              | 20         | 85                      | +/-100uF                   |
| KAWD-2415EL     | 18-36                     | +/-15                      | +/-1000                   | 1470                              | 20         | 85                      | +/-47uF                    |
| KAWS-4803.3EL   | 36-72                     | 3.3                        | 6000                      | 529                               | 20         | 78                      | 1000uF                     |
| KAWS-4805EL     | 36-72                     | 5                          | 6000                      | 744                               | 10         | 84                      | 1000uF                     |
| KAWS-4809EL     | 36-72                     | 9                          | 3333                      | 781                               | 10         | 80                      | 330uF                      |
| KAWS-4812EL     | 36-72                     | 12                         | 2500                      | 735                               | 10         | 85                      | 220uF                      |
| KAWS-4815EL     | 36-72                     | 15                         | 2000                      | 735                               | 10         | 85                      | 100uF                      |
| KAWS-4824EL     | 36-72                     | 24                         | 1250                      | 781                               | 10         | 80                      | 56uF                       |
| KAWD-4805EL     | 36-72                     | +/-5                       | +/-2500                   | 620                               | 10         | 84                      | +/-470uF                   |
| KAWD-4812EL     | 36-72                     | +/-12                      | +/-1250                   | 735                               | 10         | 85                      | +/-100uF                   |
| KAWD-4815EL     | 36-72                     | +/-15                      | +/-1000                   | 735                               | 10         | 85                      | +/-47uF                    |

*Note: Other input to output voltages may be available. Please contact factory.*

<sup>7</sup> NOMINAL INPUT VOLTAGE.

<sup>8</sup> NOMINAL INPUT VOLTAGE, FULL LOAD.

● **SELECTION GUIDE(2)**  
**4:1 25W-30W OUTPUT**

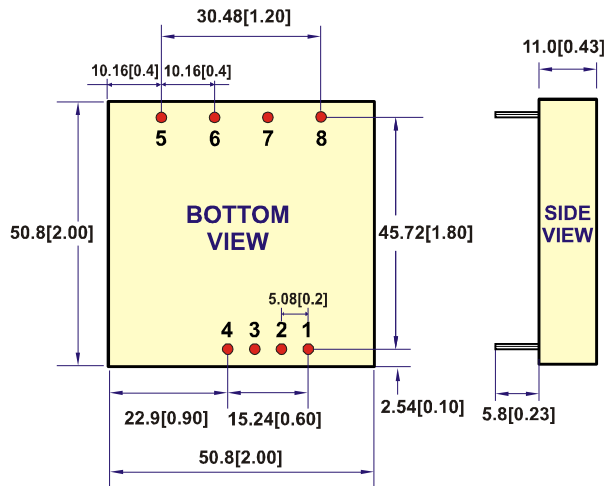
| MODEL<br>NUMBER | INPUT<br>VOLTAGE<br>(VDC) | OUTPUT<br>VOLTAGE<br>(VDC) | OUTPUT<br>CURRENT<br>(mA) | INPUT <sup>9</sup><br>CURRENT(mA) |            | EFF<br>(%) <sup>10</sup> | CAPACITOR<br>LOAD<br>(Max) |
|-----------------|---------------------------|----------------------------|---------------------------|-----------------------------------|------------|--------------------------|----------------------------|
|                 |                           |                            |                           | FULL<br>LOAD                      | NO<br>LOAD |                          |                            |
| KAWS-1205TEL    | 9-36                      | 5                          | 6000                      | 3125                              | 30         | 80                       | 1000uF                     |
| KAWS-1209TEL    | 9-36                      | 9                          | 3333                      | 3048                              | 30         | 82                       | 330uF                      |
| KAWS-1212TEL    | 9-36                      | 12                         | 2500                      | 2976                              | 30         | 84                       | 220uF                      |
| KAWS-2405TEL    | 18-72                     | 5                          | 6000                      | 1488                              | 20         | 84                       | 1000uF                     |
| KAWS-2409TEL    | 18-72                     | 9                          | 3333                      | 1470                              | 20         | 85                       | 330uF                      |
| KAWS-2412TEL    | 18-72                     | 12                         | 2500                      | 1470                              | 20         | 85                       | 220uF                      |
| KAWS-2415TEL    | 18-72                     | 15                         | 2000                      | 1560                              | 20         | 80                       | 100uF                      |
| KAWS-2424TEL    | 18-72                     | 24                         | 1250                      | 1470                              | 20         | 85                       | 56uF                       |

*Note: Other input to output voltages may be available. Please contact factory.*

<sup>9</sup> NOMINAL INPUT VOLTAGE.

<sup>10</sup> NOMINAL INPUT VOLTAGE, FULL LOAD.

## MECHANICAL DIMENSIONS



All dimensions are in millimeters[inches]

| PIN | SINGLE        | DUAL   |
|-----|---------------|--------|
| 1   | Remote On/Off |        |
| 2   | NO PIN        |        |
| 3   | -Vin          | -Vin   |
| 4   | +Vin          | +Vin   |
| 5   | NO PIN        | +Vout  |
| 6   | +Vout         | Common |
| 7   | -Vout         | -Vout  |
| 8   | TRIM          | NO PIN |

NOTE:

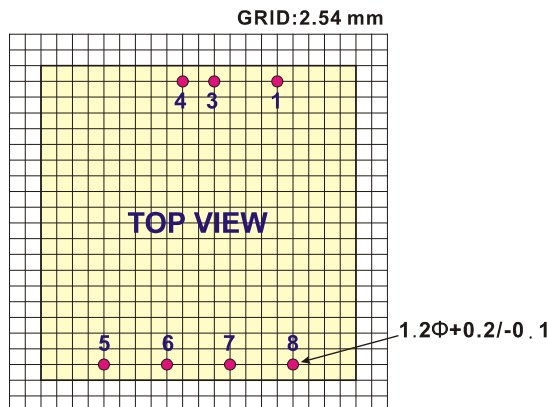
All dimensions are in millimeters [inches]

Pin Size is Tolerance 1.0Φ ±0.10mm

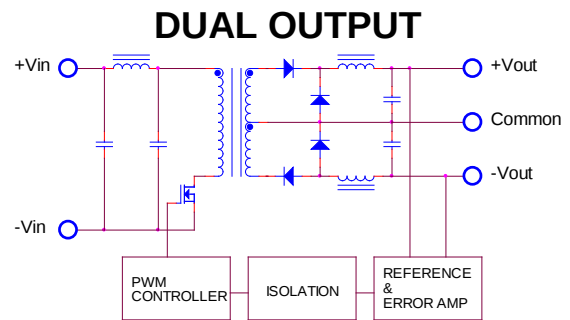
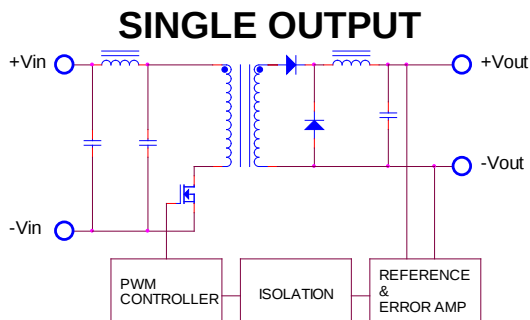
Tolerance .X or .XX= ±0.8mm

| Remote On/Off Control |  |                            |                                 |
|-----------------------|--|----------------------------|---------------------------------|
| Control Input         |  | PIN1                       | Control Common                  |
| Control Voltage       |  |                            | PIN3                            |
| ON                    |  | >+2.5VDC or Open Circuit   | Converter Shutdown Idle Current |
| OFF                   |  | <+0.8VDC or Jumper to PIN3 | 10mA                            |
|                       |  | Logic Compatibility        | CMOS or Open                    |
|                       |  |                            | Collector TTL                   |

## RECOMMENDED FOOTPRINT DETAILS



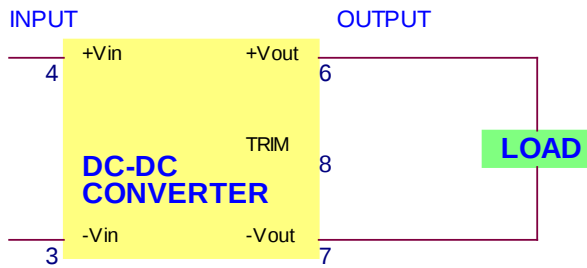
## SIMPLIFIED SCHEMATIC



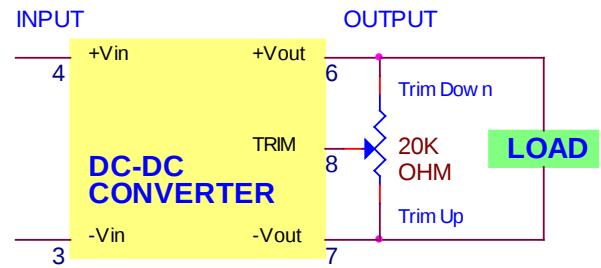
## ● TYPICAL APPLICATIONS

### SINGLE OUTPUT

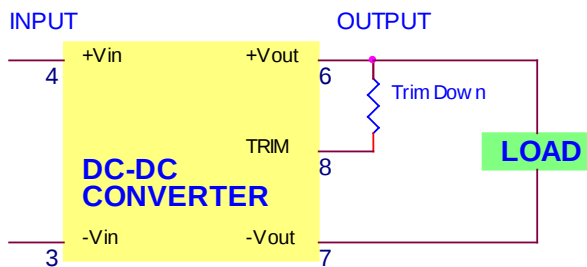
#### FIXED VOLTAGE OUTPUT



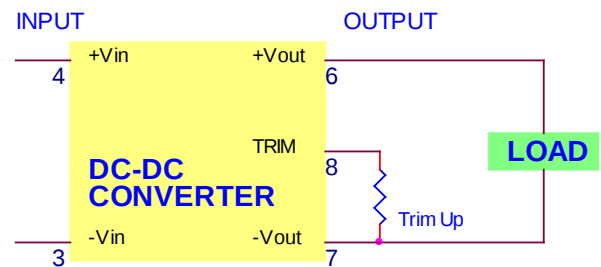
#### TRIM CONNECTIONS USING A TRIMPOT



#### FIXED-VALUE TRIM DOWN RESISTOR

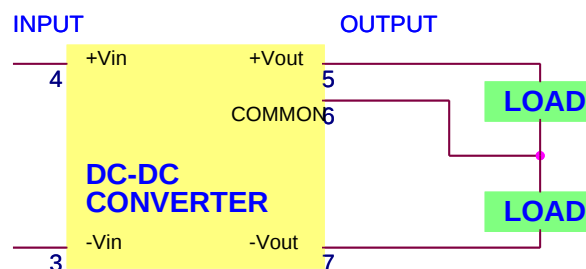


#### FIXED-VALUE TRIM UP RESISTOR



### DUAL OUTPUT

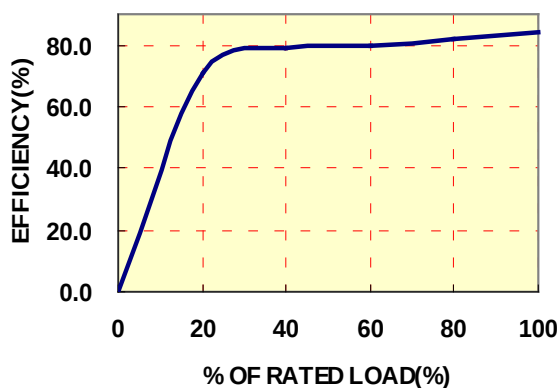
#### FIXED VOLTAGE OUTPUT



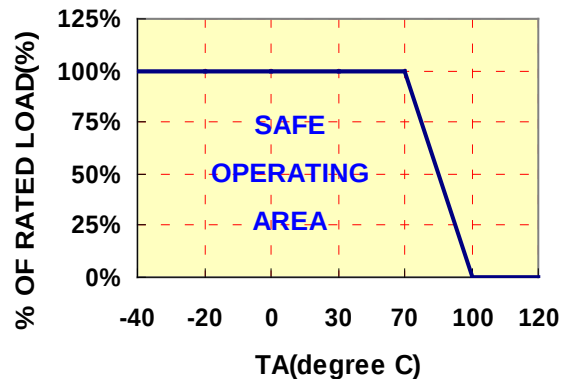
## ● TYPICAL PERFORMANCE CURVES

Specifications typical at  $T_a=25^{\circ}\text{C}$ , nominal input voltage, rated output current unless otherwise specified.

#### OUTPUT LOAD VS EFFICIENCY



#### TEMPERATURE DERATING



## ● INPUT FUSE SELECTION GUIDE

| 9-18V & 9-36V<br>INPUT VOLTAGE(VDC)                                                | 18-36V & 18-72V<br>INPUT VOLTAGE(VDC) | 36-72V<br>INPUT VOLTAGE(VDC) |
|------------------------------------------------------------------------------------|---------------------------------------|------------------------------|
| 6000mA Slow-Blow Type                                                              | 3000mA Slow-Blow Type                 | 1500mA Slow-Blow Type        |
|  |                                       |                              |

**Note:** Certain applications may require the installation of external fuse in front of the input.

## KAW-EL SERIES APPLICATION NOTES:

### EXTERNAL CAPACITANCE REQUIREMENTS:

No external capacitance is required for operation of the KAW-EL series.

To meet the reflected ripple requirements of the converter, an input impedance of less than 0.5 ohm from DC to 220 KHz is required.

External output capacitance is not required for operation; however it is recommended that 10uF tantalum and 0.1uF ceramic capacitance be selected for reduced system noise.

### Negative Outputs:

A negative output voltage may be obtained by connecting the +OUT to circuit ground and connecting -OUT as the negative output.

### Remote ON/OFF:

The remote ON/OFF pin may be left floating if this function is not use. It is recommended to drive this pin with an open collector arrangement or a relay contact. When the ON/OFF pin is pulled low with respect to the -VIN, the converter is placed in a low power drain state.

### Output TRIM:

The TRIM pin may be used to adjust the output +/-10% from the nominal setting .this function allows adjustment for voltage drops in the system wiring. If the TRIM function is not required the pin may be left floating.

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## FOR MORE INFORMATION CALL:

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