

# CQW-6K SERIES

3-5W WIDE INPUT RANGE

# DANUBE

## FEATURES

- 3-5W DIL PACKAGE
- 4.5-9V,9-18V,18-36V,36-72V WIDE INPUT RANGE
- 100% BURN-IN
- HIGH EFFICIENCY
- UL 94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- 3 YEARS WARRANTY



## OUTPUT SPECIFICATIONS

|                                       |                  |
|---------------------------------------|------------------|
| Voltage Set-point Accuracy            | +/-2% max.       |
| Temperature Coefficient               | +/-0.05%/°C      |
| Ripple & Noise(20MHz BW) <sup>1</sup> | 100mVp-p max.    |
| Line Regulation <sup>2</sup>          | +/-0.5% max.     |
| Load Regulation <sup>3</sup>          | +/-0.5% max.     |
| Minimum Load                          | 20% of Full Load |
| Short Circuit Protection              | Continuous       |
| Short Circuit Restart                 | Automatic        |
| Over Load Protection                  | 110%~180%        |
| Transient Response <sup>5</sup>       | 200uS max.       |

## INPUT SPECIFICATIONS

|                       |                  |
|-----------------------|------------------|
| Input Voltage Range   | 2:1 Input Range  |
| Input Filter          | Pi Network       |
| Protection            | Fuse Recommended |
| Remote ON/OFF Control | Table 1          |

## GENERAL SPECIFICATIONS

|                                |                           |
|--------------------------------|---------------------------|
| Efficiency                     | 70% min.                  |
| Isolation Voltage <sup>4</sup> | 6000VDC min.              |
| Isolation Resistance           | 10 <sup>9</sup> ohms min. |
| Isolation Capacitance          | 40pF max.                 |
| Switching Frequency            | 50KHz min.                |
| MTBF <sup>6</sup>              | >900,000 Hours            |
| Weight                         | 17.5g Typ.                |
| Case Material                  | Non-Conductive Plastic    |
| Case Size                      | 31.8mm*20.3mm*10.2mm      |
| Potting Material               | Epoxy(UL 94V-0)           |
| Radiated Emissions             | EN55032 Class B           |
| Safety Standard:               | UL-60950-1                |
| (designed to meet)             |                           |

## ENVIRONMENTAL SPECIFICATIONS

|                       |                     |
|-----------------------|---------------------|
| Operating Temperature | -40°C to +85°C      |
| Case Temperature      | +105°C max.         |
| Storage Temperature   | -55°C to +125°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> High Line to Low Line.

<sup>3</sup> Load Regulation is for output load current change from 20% to 100%.

<sup>4</sup> 6000VDC for 3 seconds, 2000VDC for 120 seconds.

<sup>5</sup> 25% Step Load Change.

<sup>6</sup> MIL-HDBK-217F @25 °C, Ground Benign.

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## ● SELECTION GUIDE(1) 2:1 3W 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> | Isolation<br>(VDC) |
|---------------------|---------------------------|----------------------------|---------------------------|-----------------------------------|------------|-------------------------|--------------------|
|                     |                           |                            |                           | FULL<br>LOAD                      | NO<br>LOAD |                         |                    |
| CQWS-0503.3(AC)3-6K | 4.5-9                     | 3.3                        | 900                       | 855                               | 40         | 70                      | 6000               |
| CQWS-0505(AC)3-6K   | 4.5-9                     | 5                          | 500                       | 670                               | 40         | 75                      | 6000               |
| CQWS-0512(AC)3-6K   | 4.5-9                     | 12                         | 250                       | 789                               | 40         | 76                      | 6000               |
| CQWS-0515(AC)3-6K   | 4.5-9                     | 15                         | 200                       | 789                               | 40         | 76                      | 6000               |
| CQWD-0505(AC)3-6K   | 4.5-9                     | +/-5                       | +/-300                    | 855                               | 40         | 70                      | 6000               |
| CQWD-0509(AC)3-6K   | 4.5-9                     | +/-9                       | +/-167                    | 835                               | 40         | 72                      | 6000               |
| CQWD-0512(AC)3-6K   | 4.5-9                     | +/-12                      | +/-125                    | 810                               | 40         | 74                      | 6000               |
| CQWD-0515(AC)3-6K   | 4.5-9                     | +/-15                      | +/-100                    | 800                               | 50         | 75                      | 6000               |
| CQWS-1205(AC)3-6K   | 9-18                      | 5                          | 600                       | 321                               | 22         | 78                      | 6000               |
| CQWS-1209(AC)3-6K   | 9-18                      | 9                          | 330                       | 316                               | 18         | 79                      | 6000               |
| CQWS-1212(AC)3-6K   | 9-18                      | 12                         | 250                       | 313                               | 30         | 80                      | 6000               |
| CQWS-1215(AC)3-6K   | 9-18                      | 15                         | 200                       | 313                               | 32         | 80                      | 6000               |
| CQWD-1205(AC)3-6K   | 9-18                      | +/-5                       | +/-300                    | 338                               | 18         | 74                      | 6000               |
| CQWD-1212(AC)3-6K   | 9-18                      | +/-12                      | +/-125                    | 320                               | 30         | 78                      | 6000               |
| CQWD-1215(AC)3-6K   | 9-18                      | +/-15                      | +/-100                    | 316                               | 32         | 79                      | 6000               |
| CQWS-2403.3(AC)3-6K | 18-36                     | 3.3                        | 910                       | 163                               | 10         | 76                      | 6000               |
| CQWS-2405(AC)3-6K   | 18-36                     | 5                          | 600                       | 160                               | 10         | 78                      | 6000               |
| CQWS-2409(AC)3-6K   | 18-36                     | 9                          | 330                       | 151                               | 15         | 82                      | 6000               |
| CQWS-2412(AC)3-6K   | 18-36                     | 12                         | 250                       | 156                               | 10         | 80                      | 6000               |
| CQWS-2415(AC)3-6K   | 18-36                     | 15                         | 200                       | 156                               | 10         | 80                      | 6000               |
| CQWS-2424(AC)3-6K   | 18-36                     | 24                         | 125                       | 156                               | 10         | 80                      | 6000               |
| CQWD-2405(AC)3-6K   | 18-36                     | +/-5                       | +/-300                    | 167                               | 10         | 75                      | 6000               |
| CQWD-2412(AC)3-6K   | 18-36                     | +/-12                      | +/-125                    | 156                               | 15         | 80                      | 6000               |
| CQWD-2415(AC)3-6K   | 18-36                     | +/-15                      | +/-100                    | 156                               | 15         | 80                      | 6000               |
| CQWS-4805(AC)3-6K   | 36-72                     | 5                          | 600                       | 82                                | 5          | 76                      | 6000               |
| CQWS-4809(AC)3-6K   | 36-72                     | 9                          | 330                       | 79                                | 5          | 79                      | 6000               |
| CQWS-4812(AC)3-6K   | 36-72                     | 12                         | 250                       | 80                                | 5          | 78                      | 6000               |
| CQWS-4815(AC)3-6K   | 36-72                     | 15                         | 200                       | 76                                | 5          | 82                      | 6000               |
| CQWS-4824(AC)3-6K   | 36-72                     | 24                         | 125                       | 77                                | 5          | 81                      | 6000               |
| CQWD-4805(AC)3-6K   | 36-72                     | +/-5                       | +/-300                    | 82                                | 5          | 76                      | 6000               |
| CQWD-4812(AC)3-6K   | 36-72                     | +/-12                      | +/-125                    | 80                                | 5          | 78                      | 6000               |
| CQWD-4815(AC)3-6K   | 36-72                     | +/-15                      | +/-100                    | 79                                | 5          | 79                      | 6000               |

*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) 2:1 4W-6W 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> | Isolation<br>(VDC) |
|-------------------|---------------------------|----------------------------|---------------------------|-----------------------------------|------------|--------------------------|--------------------|
|                   |                           |                            |                           | FULL<br>LOAD                      | NO<br>LOAD |                          |                    |
| CQWS-0505(AC)5-6K | 4.5-9                     | 5                          | 800                       | 1080                              | 40         | 74                       | 6000               |
| CQWS-0512(AC)5-6K | 4.5-9                     | 12                         | 333                       | 1060                              | 40         | 75                       | 6000               |
| CQWS-0515(AC)5-6K | 4.5-9                     | 15                         | 267                       | 1060                              | 40         | 75                       | 6000               |
| CQWD-0505(AC)5-6K | 4.5-9                     | +/-5                       | +/-400                    | 1125                              | 40         | 71                       | 6000               |
| CQWD-0512(AC)5-6K | 4.5-9                     | +/-12                      | +/-167                    | 1073                              | 120        | 75                       | 6000               |
| CQWD-0515(AC)5-6K | 4.5-9                     | +/-15                      | +/-133                    | 1060                              | 100        | 75                       | 6000               |
| CQWS-1205(AC)5-6K | 9-18                      | 5                          | 1000                      | 527                               | 40         | 79                       | 6000               |
| CQWS-1209(AC)5-6K | 9-18                      | 9                          | 556                       | 520                               | 40         | 80                       | 6000               |
| CQWS-1212(AC)5-6K | 9-18                      | 12                         | 470                       | 587                               | 40         | 80                       | 6000               |
| CQWS-1215(AC)5-6K | 9-18                      | 15                         | 400                       | 617                               | 41         | 81                       | 6000               |
| CQWD-1205(AC)5-6K | 9-18                      | +/-5                       | +/-500                    | 556                               | 40         | 75                       | 6000               |
| CQWD-1209(AC)5-6K | 9-18                      | +/-9                       | +/-278                    | 556                               | 40         | 75                       | 6000               |
| CQWD-1212(AC)5-6K | 9-18                      | +/-12                      | +/-208                    | 527                               | 40         | 79                       | 6000               |
| CQWD-1215(AC)5-6K | 9-18                      | +/-15                      | +/-167                    | 515                               | 41         | 81                       | 6000               |
| CQWS-2405(AC)5-6K | 18-36                     | 5                          | 1000                      | 270                               | 20         | 77                       | 6000               |
| CQWS-2409(AC)5-6K | 18-36                     | 9                          | 556                       | 257                               | 20         | 81                       | 6000               |
| CQWS-2412(AC)5-6K | 18-36                     | 12                         | 470                       | 292                               | 22         | 80                       | 6000               |
| CQWS-2415(AC)5-6K | 18-36                     | 15                         | 400                       | 301                               | 21         | 83                       | 6000               |
| CQWS-2424(AC)5-6K | 18-36                     | 24                         | 208                       | 260                               | 20         | 80                       | 6000               |
| CQWD-2405(AC)5-6K | 18-36                     | +/-5                       | +/-500                    | 270                               | 20         | 77                       | 6000               |
| CQWD-2412(AC)5-6K | 18-36                     | +/-12                      | +/-208                    | 254                               | 20         | 82                       | 6000               |
| CQWD-2415(AC)5-6K | 18-36                     | +/-15                      | +/-167                    | 252                               | 21         | 83                       | 6000               |
| CQWS-4805(AC)5-6K | 36-72                     | 5                          | 1000                      | 132                               | 10         | 79                       | 6000               |
| CQWS-4809(AC)5-6K | 36-72                     | 9                          | 556                       | 130                               | 9          | 80                       | 6000               |
| CQWS-4812(AC)5-6K | 36-72                     | 12                         | 470                       | 146                               | 9          | 80                       | 6000               |
| CQWS-4815(AC)5-6K | 36-72                     | 15                         | 400                       | 154                               | 10         | 81                       | 6000               |
| CQWS-4824(AC)5-6K | 36-72                     | 24                         | 208                       | 128                               | 10         | 81                       | 6000               |
| CQWD-4805(AC)5-6K | 36-72                     | +/-5                       | +/-500                    | 135                               | 10         | 77                       | 6000               |
| CQWD-4812(AC)5-6K | 36-72                     | +/-12                      | +/-208                    | 130                               | 12         | 80                       | 6000               |
| CQWD-4815(AC)5-6K | 36-72                     | +/-15                      | +/-167                    | 129                               | 10         | 81                       | 6000               |

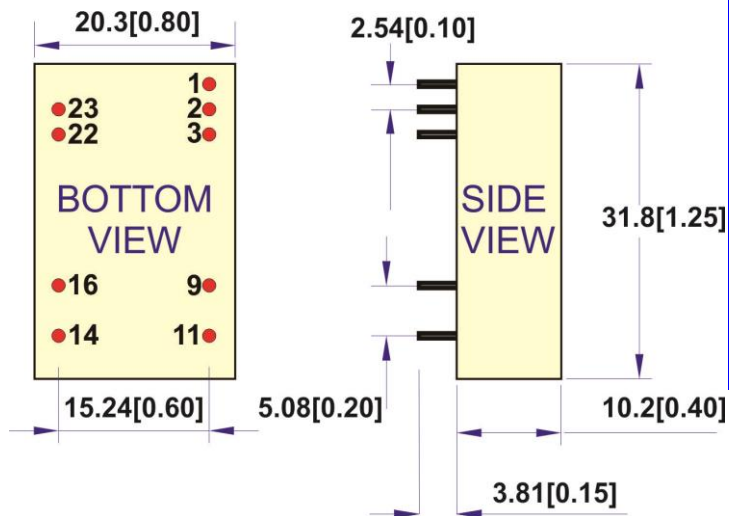
**Note:** Other input to output voltages may be available. Please contact factory.

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

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

## MECHANICAL DIMENSIONS & RECOMMENDED FOOTPRINT DETAILS

### PACKAGE "A"



| PIN     | SINGLE        | DUAL          |
|---------|---------------|---------------|
| 1       | Remote On/Off | Remote On/Off |
| 2 & 3   | -Vin          | -Vin          |
| 9       | NC            | Common        |
| 11      | NC            | -Vout         |
| 14      | +Vout         | +Vout         |
| 16      | -Vout         | Common        |
| 22 & 23 | +Vin          | +Vin          |

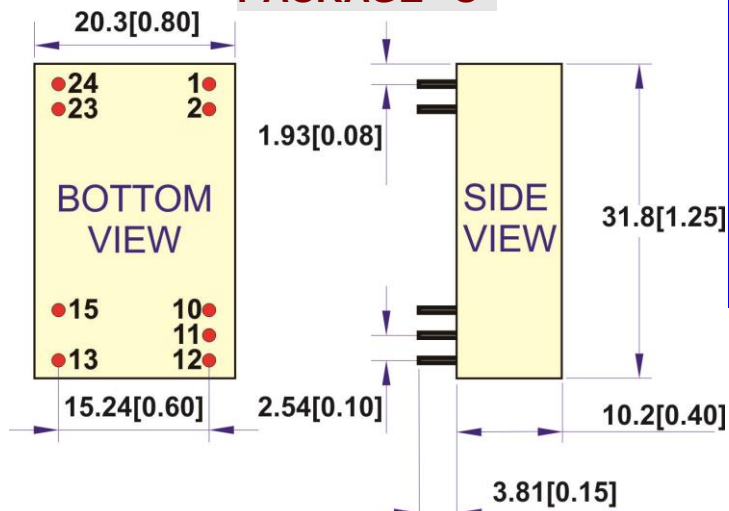
NOTE:

Pin Size is Tolerance 0.6Φ ±0.05mm

All dimensions are in mm(inches)

Tolerance .X or .XX= ±0.5mm

### PACKAGE "C"



| PIN     | SINGLE | DUAL   |
|---------|--------|--------|
| 1 & 2   | +Vin   | +Vin   |
| 10 & 11 | NC     | Common |
| 12      | -Vout  | NC     |
| 13      | +Vout  | -Vout  |
| 15      | NC     | +Vout  |
| 23 & 24 | -Vin   | -Vin   |

NOTE:

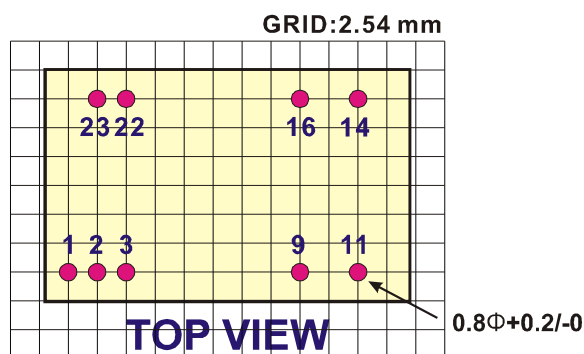
Pin Size is Tolerance 0.6Φ ±0.05mm

All dimensions are in mm(inches)

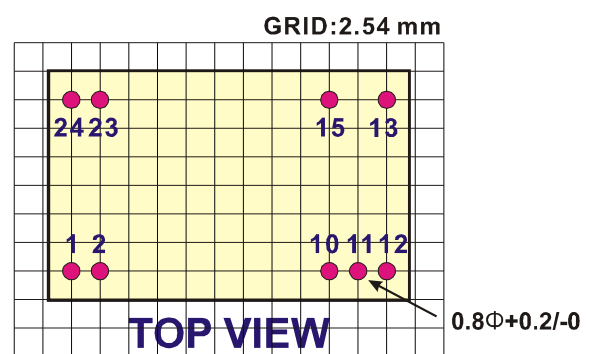
Tolerance .X or .XX= ±0.5mm

## RECOMMENDED FOOTPRINT DETAILS

### PACKAGE "A"



### PACKAGE "C"

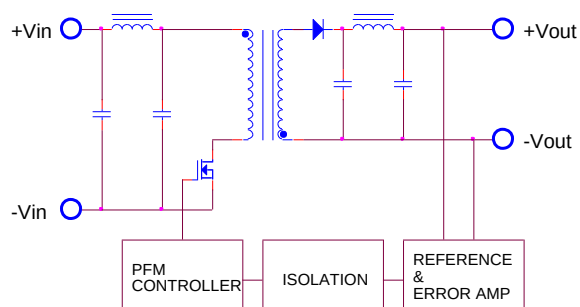


## ● Table1 (Remote On/Off Control)

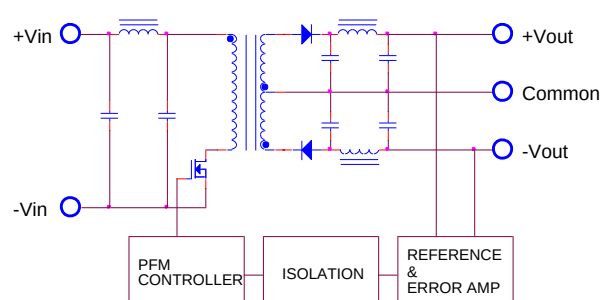
| Remote On/Off Control      |                              |        |
|----------------------------|------------------------------|--------|
| Parameter                  | Min                          | Max    |
| Supply On                  | Under 1 VDC or Open Circuit  |        |
| Supply Off                 | 4VDC                         |        |
| Standby Input Current      |                              | 0.2mA  |
| Control Input Current(On)  |                              | -0.5mA |
| Control Input Current(Off) |                              | 5mA    |
| Control Common             | Referenced to -Vin (pin 2&3) |        |

## ● SIMPLIFIED SCHEMATIC

### SINGLE OUTPUT

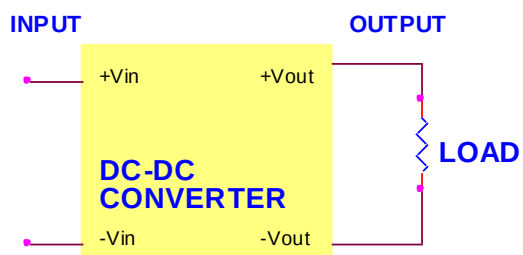


### DUAL OUTPUT

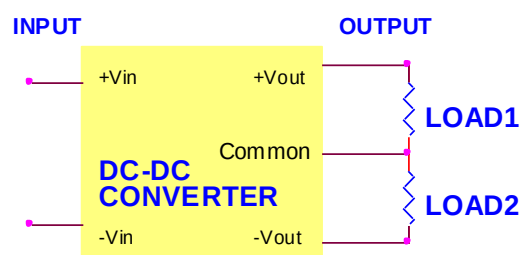


## ● TYPICAL APPLICATIONS

### SINGLE OUTPUT



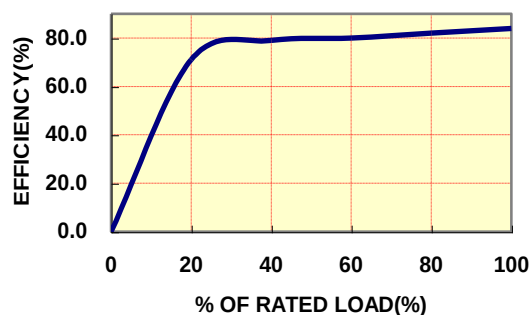
### DUAL OUTPUT



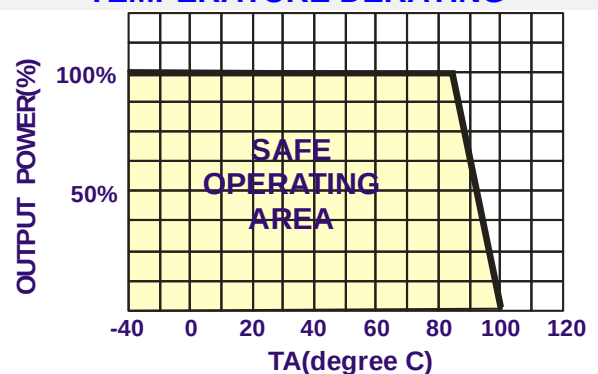
## ● TYPICAL PERFORMANCE CURVES

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

| 4.5-9V                | 9-18V                 | 18-36V               | 36-72V               |
|-----------------------|-----------------------|----------------------|----------------------|
| INPUT VOLTAGE(VDC)    | INPUT VOLTAGE(VDC)    | INPUT VOLTAGE(VDC)   | INPUT VOLTAGE(VDC)   |
| 2500mA Slow-Blow Type | 1500mA Slow-Blow Type | 600mA Slow-Blow Type | 300mA Slow-Blow Type |

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

## CQW-6K SERIES APPLICATION NOTES:

### EXTERNAL CAPACITANCE REQUIREMENTS:

No external capacitance is required for operation of the CQW-6K series.

To meet the reflected ripple requirements of the converter, an input impedance of less than 0.5 ohm from DC to 100 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.

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## FOR MORE INFORMATION CALL:

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