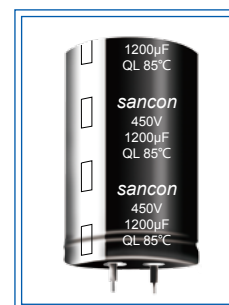


## QL(CD29L)

### Features

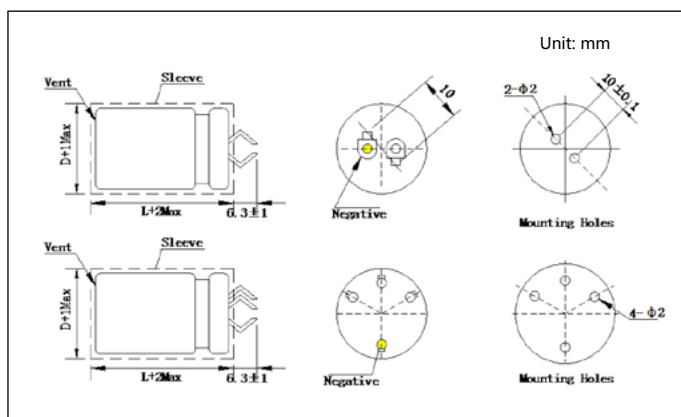
- Larger size components.
- Long useful life.
- High ripple current.
- Industrial power supplies.



### Specifications

| Item                                                      | Performance Characteristics                                                                                                                                                                                                                                                            |       |        |         |         |          |         |         |     |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|---------|---------|----------|---------|---------|-----|
| Operating Temperature Range                               | -40~+85℃                                                                                                                                                                                                                                                                               |       |        |         |         | -25~+85℃ |         |         |     |
| Rated Voltage Range                                       | 16~400V                                                                                                                                                                                                                                                                                |       |        |         |         | 450~500V |         |         |     |
| Nominal Capacitance Range                                 | 390~120000μF                                                                                                                                                                                                                                                                           |       |        |         |         |          |         |         |     |
| Capacitance Tolerance                                     | ±20%(120Hz,+20℃ )                                                                                                                                                                                                                                                                      |       |        |         |         |          |         |         |     |
| Leakage Current                                           | I ≤ 0.01CV or 1.5mA ( at 20℃ , after 5 minutes , Whichever is smaller )                                                                                                                                                                                                                |       |        |         |         |          |         |         |     |
| Dissipation Factor<br>( tgδ,+20℃ ,120Hz )                 | U <sub>R</sub> (V)                                                                                                                                                                                                                                                                     | 16    | 25     | 35      | 50      | 63-100   | 160-250 | 350-450 | 500 |
|                                                           | tgδ                                                                                                                                                                                                                                                                                    | 0.60  | 0.50   | 0.40    | 0.30    | 0.20     | 0.15    |         |     |
| Temperature Characteristics<br>(Impedance ratio at 120Hz) | U <sub>R</sub> (V)                                                                                                                                                                                                                                                                     | 16-35 | 50~100 | 160~200 | 250~400 | 450      | 500     |         |     |
|                                                           | Z -25℃ /+20℃                                                                                                                                                                                                                                                                           | 4     | 3      |         | 4       |          |         |         |     |
|                                                           | Z -40℃ /+20℃                                                                                                                                                                                                                                                                           | 15    | 10     | 6       | 8       | -        |         |         |     |
| Load Life                                                 | After applying rated voltage with specified ripple current for 5000 hours at +85℃ and then resumed 24hours:<br>Capacitance change : ±20% of the initial measured value<br>Leakage current : ≤ the initial specified value<br>Dissipation factor: ≤ 200% of the initial specified value |       |        |         |         |          |         |         |     |
| Shelf Life                                                | After storage for 1000 hours at +85℃ ,U <sub>R</sub> to be applied for 30 minutes and then resumed 24hours:<br>Capacitance change : ±20% of the initial measured value<br>Leakage current : ≤ the initial specified value<br>Dissipation factor: ≤ 200% of the initial specified value |       |        |         |         |          |         |         |     |

### Diagram of Dimensions



### Multiplier for Ripple Current

#### Frequency coefficient

| U(V) \ Frequency (Hz) | 50/60 | 120  | 1K   | 10K  | 100K |
|-----------------------|-------|------|------|------|------|
| ≤ 50                  | 0.95  | 1.00 | 1.10 | 1.15 | 1.15 |
| 63~100                | 0.90  | 1.00 | 1.16 | 1.30 | 1.33 |
| ≥ 160                 | 0.85  | 1.00 | 1.20 | 1.35 | 1.40 |

#### Temperature coefficient

| U(V) \ Temperature (°C) | +40 | +55 | +70 | +85 |
|-------------------------|-----|-----|-----|-----|
| <160                    | 2.1 | 1.8 | 1.5 | 1.0 |
| ≥ 160                   | 1.7 | 1.5 | 1.3 | 1.0 |

## Standard Size

| Rated Voltage<br>(V <sub>dc</sub> ) | Surge Voltage<br>(V <sub>dc</sub> ) | Rated Capacitance<br>(μF) | Max ESR<br>20°C 120Hz<br>(mΩ) | Type ESR<br>20°C 120Hz<br>(mΩ) | Rated ripple current<br>85°C 120Hz<br>(Arms) | Size<br>ΦD×L<br>(mm) |
|-------------------------------------|-------------------------------------|---------------------------|-------------------------------|--------------------------------|----------------------------------------------|----------------------|
| 16<br>1C                            | 20                                  | 56000                     | 14                            | 10                             | 10.4                                         | 30 X 45              |
|                                     |                                     |                           | 14                            | 10                             | 9.8                                          | 40 X 40              |
|                                     |                                     | 68000                     | 12                            | 8                              | 10.8                                         | 35 X 50              |
|                                     |                                     |                           | 12                            | 8                              | 11.5                                         | 40 X 50              |
|                                     |                                     | 82000                     | 10                            | 7                              | 11.8                                         | 35 X 60              |
|                                     |                                     |                           | 10                            | 7                              | 11.8                                         | 40 X 50              |
|                                     |                                     | 100000                    | 8                             | 6                              | 13.2                                         | 35 X 80              |
|                                     |                                     |                           | 8                             | 6                              | 13.5                                         | 40 X 60              |
|                                     |                                     | 120000                    | 7                             | 5                              | 15.3                                         | 35 X 105             |
|                                     |                                     |                           | 7                             | 5                              | 14.8                                         | 40 X 80              |
| 25<br>1E                            | 32                                  | 33000                     | 20                            | 14                             | 8.1                                          | 35 X 40              |
|                                     |                                     |                           | 20                            | 14                             | 8.7                                          | 40 X 40              |
|                                     |                                     | 39000                     | 17                            | 12                             | 9.0                                          | 35 X 45              |
|                                     |                                     |                           | 17                            | 12                             | 9.6                                          | 40 X 40              |
|                                     |                                     | 47000                     | 14                            | 10                             | 9.6                                          | 35 X 50              |
|                                     |                                     |                           | 12                            | 8                              | 10.3                                         | 35 X 60              |
|                                     |                                     | 56000                     | 12                            | 8                              | 10.8                                         | 40 X 50              |
|                                     |                                     |                           | 10                            | 7                              | 11.3                                         | 35 X 80              |
|                                     |                                     | 68000                     | 10                            | 7                              | 11.8                                         | 40 X 60              |
|                                     |                                     |                           | 8                             | 6                              | 13.5                                         | 40 X 80              |
| 35<br>1V                            | 44                                  | 27000                     | 20                            | 14                             | 8.2                                          | 35 X 45              |
|                                     |                                     |                           | 20                            | 14                             | 8.0                                          | 40 X 40              |
|                                     |                                     | 33000                     | 16                            | 11                             | 8.7                                          | 35 X 50              |
|                                     |                                     |                           | 14                            | 10                             | 10.3                                         | 35 X 60              |
|                                     |                                     | 39000                     | 14                            | 10                             | 9.6                                          | 40 X 50              |
|                                     |                                     |                           | 11                            | 8                              | 11.4                                         | 35 X 80              |
|                                     |                                     | 47000                     | 11                            | 8                              | 10.8                                         | 40 X 60              |
|                                     |                                     |                           | 10                            | 7                              | 12.1                                         | 40 X 70              |
|                                     |                                     | 56000                     | 10                            | 7                              | 12.1                                         | 40 X 70              |
|                                     |                                     |                           | 8                             | 6                              | 14.2                                         | 40 X 80              |
| 50<br>1H                            | 63                                  | 15000                     | 27                            | 19                             | 7.7                                          | 35 X 40              |
|                                     |                                     |                           | 27                            | 19                             | 8.1                                          | 40 X 40              |
|                                     |                                     | 18000                     | 22                            | 16                             | 8.3                                          | 35 X 45              |
|                                     |                                     |                           | 22                            | 16                             | 8.3                                          | 40 X 40              |
|                                     |                                     | 22000                     | 18                            | 13                             | 9.1                                          | 35 X 50              |
|                                     |                                     |                           | 18                            | 13                             | 9.4                                          | 40 X 50              |
|                                     |                                     | 27000                     | 15                            | 10                             | 11.2                                         | 35 X 80              |
|                                     |                                     |                           | 15                            | 10                             | 10.8                                         | 40 X 60              |
|                                     |                                     | 33000                     | 12                            | 8                              | 13.4                                         | 35 X 80              |
|                                     |                                     |                           | 12                            | 8                              | 13.4                                         | 40 X 70              |
| 63<br>1J                            | 79                                  | 12000                     | 10                            | 7                              | 16.8                                         | 40 X 80              |
|                                     |                                     |                           | 22                            | 16                             | 8.7                                          | 35 X 50              |
|                                     |                                     | 15000                     | 22                            | 16                             | 8.6                                          | 40 X 40              |
|                                     |                                     |                           | 18                            | 12                             | 10.2                                         | 35 X 70              |
|                                     |                                     | 18000                     | 18                            | 12                             | 9.5                                          | 40 X 50              |
|                                     |                                     |                           | 15                            | 10                             | 11.2                                         | 35 X 80              |
|                                     |                                     | 27000                     | 15                            | 10                             | 10.7                                         | 40 X 60              |
|                                     |                                     |                           | 10                            | 7                              | 12.7                                         | 40 X 80              |
|                                     |                                     | 39000                     | 10                            | 7                              | 12.7                                         | 40 X 80              |
|                                     |                                     |                           | 8                             | 6                              | 14.2                                         | 40 X 80              |
| 80<br>1K                            | 100                                 | 8200                      | 32                            | 23                             | 6.9                                          | 35×50                |
|                                     |                                     |                           | 27                            | 19                             | 8.7                                          | 35×60                |
|                                     |                                     | 10000                     | 22                            | 16                             | 9.7                                          | 35×70                |
|                                     |                                     |                           | 22                            | 16                             | 9.0                                          | 40×50                |
|                                     |                                     | 12000                     | 18                            | 12                             | 10.5                                         | 35×80                |
|                                     |                                     |                           | 18                            | 12                             | 10.2                                         | 40×60                |
|                                     |                                     | 15000                     | 15                            | 10                             | 12.3                                         | 40×80                |
|                                     |                                     |                           | 15                            | 10                             | 12.3                                         | 40×80                |

## Standard Size

| Rated Voltage<br>(V <sub>dc</sub> ) | Surge Voltage<br>(V <sub>dc</sub> ) | Rated Capacitance<br>(μF) | Max ESR<br>20°C 120Hz<br>(mΩ) | Type ESR<br>20°C 120HZ<br>(mΩ) | Rated ripple current<br>85°C 120Hz<br>(Arms) | Size<br>ΦD×L<br>(mm) |
|-------------------------------------|-------------------------------------|---------------------------|-------------------------------|--------------------------------|----------------------------------------------|----------------------|
| 100<br>2A                           | 125                                 | 5600                      | 47                            | 33                             | 7.0                                          | 35×45                |
|                                     |                                     |                           | 47                            | 33                             | 7.4                                          | 40×40                |
|                                     |                                     | 6800                      | 39                            | 27                             | 8.0                                          | 35×50                |
|                                     |                                     |                           | 39                            | 27                             | 8.9                                          | 40×50                |
|                                     |                                     | 8200                      | 32                            | 23                             | 9.6                                          | 35×70                |
|                                     |                                     |                           | 32                            | 23                             | 9.6                                          | 40×60                |
|                                     |                                     | 10000                     | 27                            | 19                             | 10.4                                         | 35×80                |
|                                     |                                     |                           | 27                            | 19                             | 10.2                                         | 40×60                |
|                                     |                                     | 12000                     | 22                            | 16                             | 12.3                                         | 40×80                |
|                                     |                                     |                           |                               |                                |                                              |                      |
| 160<br>2C                           | 200                                 | 2200                      | 91                            | 63                             | 4.9                                          | 35×45                |
|                                     |                                     | 2700                      | 74                            | 52                             | 5.3                                          | 35×50                |
|                                     |                                     | 3300                      | 60                            | 42                             | 5.5                                          | 35×70                |
|                                     |                                     |                           | 60                            | 42                             | 5.5                                          | 40×60                |
|                                     |                                     | 3900                      | 51                            | 36                             | 5.9                                          | 35×80                |
|                                     |                                     | 4700                      | 42                            | 30                             | 7.3                                          | 40×80                |
| 200<br>2D                           | 250                                 | 1500                      | 133                           | 93                             | 4.3                                          | 35×40                |
|                                     |                                     | 1800                      | 111                           | 77                             | 4.7                                          | 35×45                |
|                                     |                                     | 2200                      | 91                            | 63                             | 5.4                                          | 35×50                |
|                                     |                                     |                           | 91                            | 63                             | 5.4                                          | 40×40                |
|                                     |                                     | 2700                      | 74                            | 52                             | 5.9                                          | 35×60                |
|                                     |                                     |                           | 74                            | 52                             | 5.9                                          | 40×50                |
|                                     |                                     | 3300                      | 60                            | 42                             | 6.5                                          | 35×80                |
|                                     |                                     |                           | 60                            | 42                             | 6.5                                          | 40×60                |
|                                     |                                     | 3900                      | 51                            | 36                             | 7.0                                          | 40×80                |
|                                     |                                     | 4700                      | 42                            | 30                             | 9.2                                          | 40×90                |
| 250<br>2E                           | 300                                 | 1000                      | 199                           | 139                            | 3.7                                          | 35×40                |
|                                     |                                     | 1200                      | 166                           | 116                            | 3.8                                          | 35×45                |
|                                     |                                     | 1500                      | 133                           | 93                             | 4.4                                          | 35×50                |
|                                     |                                     |                           | 133                           | 93                             | 4.5                                          | 40×40                |
|                                     |                                     | 1800                      | 111                           | 77                             | 5.0                                          | 35×70                |
|                                     |                                     |                           | 111                           | 77                             | 5.0                                          | 40×50                |
|                                     |                                     | 2200                      | 91                            | 63                             | 5.4                                          | 35×70                |
|                                     |                                     | 2700                      | 74                            | 52                             | 6.9                                          | 40×80                |
| 350<br>2V                           | 400                                 | 680                       | 293                           | 205                            | 3.6                                          | 35×45                |
|                                     |                                     |                           | 293                           | 205                            | 3.6                                          | 40×40                |
|                                     |                                     | 820                       | 243                           | 170                            | 4.5                                          | 35×60                |
|                                     |                                     |                           | 243                           | 170                            | 4.3                                          | 40×50                |
|                                     |                                     | 1000                      | 199                           | 139                            | 5.2                                          | 35×70                |
|                                     |                                     |                           | 199                           | 139                            | 4.9                                          | 40×60                |
|                                     |                                     | 1200                      | 166                           | 116                            | 5.5                                          | 35×80                |
|                                     |                                     |                           | 166                           | 116                            | 5.6                                          | 40×70                |
|                                     |                                     | 1500                      | 133                           | 93                             | 6.5                                          | 40×80                |
|                                     |                                     |                           | 133                           | 93                             | 6.2                                          | 45×70                |
|                                     |                                     | 1800                      | 111                           | 77                             | 7.9                                          | 40×100               |
|                                     |                                     |                           | 111                           | 77                             | 7.1                                          | 45×70                |
|                                     |                                     | 2200                      | 91                            | 63                             | 8.7                                          | 40×100               |
|                                     |                                     |                           |                               |                                |                                              |                      |

## Standard Size

| Rated Voltage<br>(V <sub>dc</sub> ) | Surge Voltage<br>(V <sub>dc</sub> ) | Rated Capacitance<br>(μF) | Max ESR<br>20°C 120Hz<br>(mΩ) | Type ESR<br>20°C 120Hz<br>(mΩ) | Rated ripple<br>current<br>85°C 120Hz<br>(Arms) | Size<br>ΦD×L<br>(mm) |
|-------------------------------------|-------------------------------------|---------------------------|-------------------------------|--------------------------------|-------------------------------------------------|----------------------|
| 400<br>2G                           | 450                                 | 560                       | 355                           | 249                            | 3.2                                             | 35×50                |
|                                     |                                     |                           | 355                           | 249                            | 2.8                                             | 40×40                |
|                                     |                                     | 680                       | 293                           | 205                            | 3.7                                             | 35×60                |
|                                     |                                     |                           | 293                           | 205                            | 3.8                                             | 40×60                |
|                                     |                                     | 820                       | 243                           | 170                            | 4.2                                             | 35×60                |
|                                     |                                     |                           | 243                           | 170                            | 4.1                                             | 40×50                |
|                                     |                                     | 1000                      | 199                           | 139                            | 4.9                                             | 35×70                |
|                                     |                                     |                           | 199                           | 139                            | 4.8                                             | 40×60                |
|                                     |                                     |                           | 199                           | 139                            | 4.6                                             | 45×50                |
|                                     |                                     | 1200                      | 166                           | 116                            | 5.8                                             | 35×80                |
|                                     |                                     |                           | 166                           | 116                            | 5.5                                             | 40×60                |
|                                     |                                     | 1500                      | 133                           | 93                             | 6.9                                             | 40×90                |
|                                     |                                     |                           | 133                           | 93                             | 6.6                                             | 45×70                |
|                                     |                                     |                           | 133                           | 93                             | 6.8                                             | 45×80                |
|                                     |                                     | 1800                      | 111                           | 77                             | 7.9                                             | 40×100               |
|                                     |                                     |                           | 111                           | 77                             | 7.3                                             | 45×80                |
| 450<br>2W                           | 500                                 | 470                       | 424                           | 296                            | 3.0                                             | 35×50                |
|                                     |                                     |                           | 424                           | 296                            | 3.0                                             | 40×40                |
|                                     |                                     | 560                       | 355                           | 249                            | 3.1                                             | 35×50                |
|                                     |                                     |                           | 355                           | 249                            | 3.3                                             | 35×60                |
|                                     |                                     |                           | 355                           | 249                            | 3.4                                             | 40×50                |
|                                     |                                     | 680                       | 293                           | 205                            | 3.5                                             | 35×60                |
|                                     |                                     |                           | 293                           | 205                            | 3.8                                             | 35×70                |
|                                     |                                     |                           | 293                           | 205                            | 3.8                                             | 40×60                |
|                                     |                                     | 820                       | 243                           | 170                            | 4.6                                             | 35×80                |
|                                     |                                     |                           | 243                           | 170                            | 4.4                                             | 40×60                |
|                                     |                                     | 1000                      | 199                           | 139                            | 5.7                                             | 35×80                |
|                                     |                                     |                           | 199                           | 139                            | 5.2                                             | 40×60                |
|                                     |                                     | 1200                      | 166                           | 116                            | 5.9                                             | 40×70                |
|                                     |                                     |                           | 166                           | 116                            | 6.2                                             | 45×70                |
|                                     |                                     | 1500                      | 133                           | 93                             | 7.3                                             | 40×100               |
|                                     |                                     |                           | 133                           | 93                             | 7.0                                             | 45×80                |
|                                     |                                     | 1800                      | 111                           | 77                             | 7.9                                             | 45×100               |
| 500<br>2H                           | 550                                 | 390                       | 510                           | 357                            | 1.9                                             | 35×50                |
|                                     |                                     | 470                       | 424                           | 296                            | 2.3                                             | 35×60                |
|                                     |                                     | 560                       | 355                           | 249                            | 2.5                                             | 35×60                |
|                                     |                                     |                           | 355                           | 249                            | 2.7                                             | 40×60                |
|                                     |                                     | 680                       | 293                           | 205                            | 3.1                                             | 35×80                |
|                                     |                                     |                           | 293                           | 205                            | 2.8                                             | 40×70                |
|                                     |                                     | 820                       | 243                           | 170                            | 3.4                                             | 35×90                |
|                                     |                                     |                           | 243                           | 170                            | 3.3                                             | 40×70                |
|                                     |                                     | 1000                      | 199                           | 139                            | 3.9                                             | 40×80                |
|                                     |                                     |                           | 199                           | 139                            | 3.9                                             | 45×70                |
|                                     |                                     | 1200                      | 166                           | 116                            | 4.3                                             | 40×90                |
|                                     |                                     | 1500                      | 133                           | 93                             | 4.8                                             | 40×100               |