

## 2. User's guide for aluminum electrolytic capacitors

### 2-1. List of product

#### ● Miniature Aluminum Electrolytic Capacitors

| Series                         | Application  | Temperature Range (°C) | Standard | Downsized | Low Impedance | Long Life | Solvent Proof | Rated Voltage (V) | Capacitance Range (uF) | Life (hrs)     | Page |
|--------------------------------|--|------------------------|----------|-----------|---------------|-----------|---------------|-------------------|------------------------|----------------|------|
| Low Profile                    | PSE Standard Height 5mm                              | -40 to +85             | ●        |           |               |           |               | 4 to 50           | 0.1 to 330             | 1000           | P20  |
|                                | PHE Standard Height 5mm                              | -55 to +105            | ●        |           |               |           | ●             | 4 to 50           | 0.1 to 100             | 1000           | P22  |
|                                | PSA Standard Height 7mm                              | -40 to +85             | ●        |           |               |           |               | 6.3 to 63         | 0.1 to 470             | 1000           | P24  |
|                                | PHA Standard Height 5mm                              | -55 to +105            | ●        |           |               |           | ●             | 6.3 to 50         | 0.1 to 150             | 1000           | P26  |
|                                | PLE Long life Height 5mm                             | -55 to +105            |          |           |               | ●         | ●             | 4 to 50           | 0.1 to 100             | 2000           | P28  |
|                                | PLA Long life Height 7mm                             | -55 to +105            |          |           |               | ●         | ●             | 6.3 to 50         | 0.1 to 150             | 2000           | P30  |
| Standard                       | MLS 85°C Standard type                               | -40 to +85             | ●        |           |               |           |               | 6.3 to 500        | 0.1 to 33000           | 2000           | P32  |
|                                | MLC 85°C Downsized                                   | -40 to +85             | ●        | ●         |               |           |               | 6.3 to 500        | 0.1 to 10000           | 2000           | P35  |
|                                | MHD 105°C Downsized                                  | -40(-25) to +105       | ●        | ●         |               |           |               | 6.3 to 500        | 0.1 to 68000           | 2000           | P38  |
|                                | MLH 105°C Standard type                              | -40(-25) to +105       | ●        |           |               |           |               | 6.3 to 500        | 0.1 to 33000           | 1000 to 2000   | P41  |
| Low Impedance                  | ZLE Height 5mm                                       | -55 to +105            |          |           | ●             |           | ●             | 6.3 to 35         | 1 to 100               | 2000           | P44  |
|                                | ZLA Height 7mm                                       | -40 to +105            |          |           | ●             |           |               | 6.3 to 50         | 1 to 330               | 2000           | P46  |
|                                | ZAH Height 7mm High ripple                           | -40 to +105            |          |           | ●             |           |               | 6.3 to 50         | 1 to 330               | 3000           | P48  |
|                                | ZLS Long life  | -55 to +105            |          |           | ●             | ●         | ●             | 6.3 to 100        | 18 to 15000            | 2000 to 5000   | P50  |
|                                | ZLT Long life, Downsized                             | -55 to +105            |          | ●         | ●             | ●         | ●             | 6.3 to 50         | 33 to 18000            | 2000 to 5000   | P53  |
|                                | ZLW Long life, High ripple, Downsized                | -55 to +105            |          | ●         | ●             | ●         | ●             | 6.3 to 35         | 330 to 12000           | 4000 to 7000   | P56  |
|                                | ZLU Long life, High ripple                           | -55 to +105            |          |           | ●             | ●         | ●             | 6.3 to 50         | 1 to 1200              | 10000          | P58  |
|                                | ZLQ Long life, Low Impedance                         | -55 to +105            |          |           | ●             | ●         | ●             | 6.3 to 50         | 22 to 18000            | 4000 to 10000  | P60  |
|                                | ZLV Long life, High ripple                           | -40 to +105            |          |           | ●             | ●         |               | 10 to 100         | 0.47 to 15000          | 4000 to 5000   | P63  |
|                                | UZS Super Low ESR                                    | -40 to +105            |          |           | ●             | ●         |               | 6.3 to 100        | 1 to 8200              | 2000 to 5000   | P66  |
|                                | UZT Super Low ESR, High ripple                       | -40 to +105            |          |           | ●             | ●         |               | 6.3 to 100        | 2.2 to 10000           | 6000 to 10000  | P69  |
|                                | UZV Super Low ESR, High reliability                  | -40 to +105            |          |           | ●             | ●         |               | 6.3 to 100        | 0.47 to 18000          | 4000 to 10000  | P72  |
|                                | UZQ Long life, Low Impedance                         | -40 to +105            |          |           | ●             | ●         |               | 6.3 to 100        | 4.7 to 18000           | 6000 to 10000  | P75  |
|                                | UZX Low Impedance, High ripple                       | -40 to +105            |          |           | ●             | ●         |               | 6.3 to 100        | 4.7 to 18000           | 6000 to 10000  | P78  |
| MLG For switching power supply | -55(-25) to +105                                     |                        |          | ●         | ●             |           | 6.3 to 450    | 0.47 to 15000     | 2000 to 5000           | P81            |      |
| High Reliability               | MLT 85°C Long life                                   | -40(-25) to +85        |          |           |               | ●         |               | 400 to 500        | 10 to 150              | 8000           | P86  |
|                                | LDS High ripple, Downsized, For LED light            | -40(-25) to +105       |          | ●         |               | ●         |               | 160 to 500        | 1 to 330               | 6000           | P88  |
|                                | LDT High ripple, Downsized, Long life, For LED light | -40(-25) to +105       |          | ●         |               | ●         |               | 160 to 500        | 1 to 330               | 12000          | P91  |
|                                | MRC Downsized, High ripple                           | -40(-25) to +105       |          | ●         |               | ●         |               | 160 to 500        | 4.7 to 390             | 2000           | P94  |
|                                | MRG High ripple, Long life                           | -40(-25) to +105       |          |           |               | ●         |               | 160 to 500        | 4.7 to 330             | 2000 to 5000   | P97  |
|                                | MRS High ripple, Long life                           | -40(-25) to +105       |          |           |               | ●         |               | 160 to 500        | 4.7 to 330             | 5000           | P99  |
|                                | MRT High ripple, Long life                           | -40(-25) to +105       |          |           |               | ●         |               | 160 to 500        | 3.3 to 330             | 7000 to 10000  | P101 |
|                                | MRU High ripple, Long life                           | -40(-25) to +105       |          |           |               | ●         |               | 160 to 500        | 4.7 to 470             | 8000 to 12000  | P103 |
|                                | MRV High ripple, Long life                           | -40(-25) to +105       |          |           |               | ●         |               | 160 to 500        | 1 to 470               | 8000 to 12000  | P105 |
|                                | MRW High ripple, Long life                           | -40(-25) to +105       |          |           |               | ●         |               | 160 to 500        | 1 to 220               | 15000          | P108 |
|                                | MRX High ripple, Long life                           | -40(-25) to +105       |          |           |               | ●         |               | 160 to 450        | 1 to 220               | 20000          | P111 |
|                                | PRU Wide Temperature, High ripple, Long life         | -40 to +105            |          |           |               | ●         |               | 160 to 500        | 4.7 to 470             | 5000 to 12000  | P114 |
|                                | PRV Wide Temperature, High ripple, Long life         | -40 to +105            |          |           |               | ●         |               | 160 to 500        | 4.7 to 470             | 12000 to 15000 | P117 |
|                                | MLV Permissible Spike test, High ripple              | -40(-25) to +105       |          |           |               | ●         |               | 450 to 500        | 4.7 to 180             | 3000           | P120 |
|                                | WTC Wide temperature, Long life                      | -55(-25) to +105       |          |           | ●             | ●         | ●             | 10 to 450         | 4.7 to 4700            | 3000 to 5000   | P122 |
|                                | WTD Wide temperature, Ultra-Low r, Long life         | -55 to +125            |          |           | ●             | ●         | ●             | 10 to 50          | 10 to 4700             | 2000 to 4000   | P124 |
|                                | WTH Wide temperature                                 | -55 to +150            |          |           |               | ●         | ●             | 10 to 50          | 100 to 3300            | 1000           | P126 |
|                                | MTX Wide temperature, Low Impedance                  | -40 to +130            |          |           | ●             | ●         |               | 10 to 100         | 4.7 to 4700            | 2000 to 4000   | P128 |

## ● Miniature Aluminum Electrolytic Capacitors

| Series      | Application | Temperature Range (°C)              | Standard         | Downsized   | Low Impedance | Long Life | Solvent Proof | Rated Voltage (V) | Capacitance Range (uF) | Life (hrs) | Page |
|-------------|-------------|-------------------------------------|------------------|---|---------------|-----------|---------------|-------------------|------------------------|------------|------|
| Bi-Polar    | QBP         | Bi-Polar Standard                   | -40(-25) to +85  | ●   |               |           |               | 6.3 to 250        | 3.3 to 6800            | 2000       | P130 |
|             | HBP         | Bi-polar Standard, Wide temperature | -55(-40) to +105 | ●   |               |           |               | 6.3 to 250        | 3.3 to 6800            | 1000       | P132 |
| Special Use | DBC         | Double-Cap                          | Application      | - Standard type : MLS, MLH<br>- Low- impedance type : ZLS, ZLT, ZLV, ZLW, UZS, ZLU, UZT, UZV, MLG<br>- High reliability type : LDS, LDT, MRS, MRT, MRU, MRV, MRW, MRX, WTC, WTD,WTH |               |           |               |                   |                        |            | P134 |

## ● Large Can Aluminum Electrolytic Capacitors

| Series              | Application | Temperature Range (°C)   | Standard         | Downsized | Low Impedance | Long Life | Solvent Proof | Rated Voltage (V) | Capacitance Range (uF) | Life (hrs)           | Page |
|---------------------|-------------|--|------------------|-----------|---------------|-----------|---------------|-------------------|------------------------|----------------------|------|
| PCB Terminal Type   | MSS         | 85°CStandard   | -40(-25) to +85  | ●         |               |           |               | 16 to 500         | 56 to 56000            | 2000                 | P135 |
|                     | MDS         | 85°CDownsized  | -40(-25) to +85  |           | ●             |           |               | 160 to 450        | 120 to 3900            | 2000                 | P140 |
|                     | MST         | 85°C Long life   | -40(-25) to +85  | ●         |               |           |               | 16 to 450         | 47 to 47000            | 5000                 | P143 |
|                     | MSH         | 105°C Standard   | -40(-25) to +105 | ●         |               |           |               | 16 to 450         | 47 to 47000            | 3000                 | P148 |
|                     | MDH         | 105°C Smaller sized  | -40(-25) to +105 |           | ●             |           |               | 160 to 500        | 56 to 3300             | 2000                 | P153 |
|                     | MUD         | 105°C Ultra smaller sized  | -40(-25) to +105 |           | ●             |           |               | 160 to 450        | 100 to 3300            | 2000                 | P157 |
|                     | MHS         | 105°C Low profile sized  | -40(-25) to +105 |           | ●             |           |               | 200 to 450        | 47 to 680              | 3000                 | P160 |
|                     | MHL         | 105°C Long life  | -40(-25) to +105 |           |               |           | ●             | 16 to 450         | 560 to 47000           | 5000                 | P162 |
|                     | MHP         | 105°C Long life  | -40(-25) to +105 |           |               |           | ●             | 160 to 500        | 47 to 2700             | 7000                 | P166 |
|                     | MHQ         | 105°C Long life  | -40(-25) to +105 |           |               |           | ●             | 200 to 450        | 39 to 1500             | 10000                | P169 |
|                     | MQD         | 105°C Long life, Smaller-sized   | -25 to +105      |           | ●             |           | ●             | 200 to 450        | 82 to 2200             | 5000                 | P171 |
|                     | MQR         | 105°C High ripple current  | -40(-25) to +105 |           |               |           |               | 200 to 450        | 82 to 2200             | 3000                 | P173 |
|                     | MAV         | 105°C Permissible abnormal voltage                                     | -25 to +105      |           |               |           |               | 200,400,420       | 33 to 1200             | 2000                 | P175 |
|                     | MOV         | 105°C Permissible overvoltage  | -40(-25) to +105 |           |               |           |               | 200,400,450       | 82 to 2200             | 2000                 | P177 |
| For Inverter Use    | MRD         | 105°C Permissible for rapid charge and Discharge application, Inverter | -25 to +105      |           |               |           |               | 350 to 450        | 82 to 820              | 3000                 | P179 |
|                     | MAC         | 85°C For Air conditioning system                                       | -25 to +85       |           |               | ●         |               | 400, 450          | 560 to 1000            | 3000                 | P181 |
|                     | MSV         | 85°C For Air conditioning system, Long life                            | -25 to +85       |           |               | ●         |               | 450               | 560 to 1000            | 5000                 | P182 |
|                     | MSR         | 85°C High ripple current   | -25 to +85       |           |               | ●         |               | 400,450           | 560 to 1000            | 5000                 | P183 |
|                     | MSP         | 85°C High ripple current, Long life                                    | -25 to +85       |           |               | ●         |               | 400,450,500       | 330 to 820             | 8000                 | P184 |
|                     | MBV         | 85°C Permissible Spike test  | -40 to +85       |           |               | ●         |               | 450, 500          | 68 to 680              | 3000                 | P186 |
| Screw Terminal Type | MDV         | 105°C Permissible Spike test,  | -40 to +105      |           |               | ●         |               | 450, 500          | 56 to 470              | 2000                 | P188 |
|                     | MCA         | 85°C Standard  | -40(-25) to +85  | ●         |               |           |               | 10 to 500         | 1000 to 2200000        | 2000                 | P190 |
|                     | MCS         | 85°C Long life   | -40(-25) to +85  | ●         |               |           | ●             | 10 to 500         | 1000 to 2200000        | 5000                 | P193 |
|                     | MCW         | 85°C Long life   | -25 to +85       |           |               | ●         |               | 350 to 500        | 1000 to 27000          | 20000                | P196 |
|                     | MCT         | 85°C Smaller sized   | -25 to +85       |           | ●             | ●         |               | 350 to 500        | 1000 to 18000          | 5000                 | P198 |
|                     | MCD         | 85°C Smaller sized, High ripple  | -25 to +85       |           | ●             |           |               | 350 to 500        | 1000 to 22000          | 5000                 | P200 |
|                     | MCI         | 85°C Higher capacitance  | -40 to +85       |           |               |           |               | 10 to 450         | 820 to 22000           | 5000                 | P202 |
|                     | MCG         | 105°C Standard   | -40(-25) to +105 | ●         |               |           |               | 10 to 450         | 180 to 680000          | 2000                 | P204 |
| Special             | MCH         | 105°C Long life  | -40(-25) to +105 | ●         |               |           |               | 10 to 500         | 220 to 1500000         | 5000                 | P208 |
|                     | PHB         | For Photoflash   | -20 to +55       |           |               |           |               | 330, 360          | 200 to 1500            | 5000 Times           | P211 |
|                     | WCM         | For welding machine  | -25 to 70        |           |               |           |               | 315, 475          | 100 to 330             | 40°C<br>1000000Times | P213 |
|                     | MCR         | 85°C Permissible for rapid charge and Discharge application            | -25 to +85       |           |               |           |               | 350 to 500        | 680 to 15000           | 5000                 | P214 |