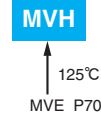


# Alchip™-MVH Series

- Lower ESR, Higher ripple current
- Endurance : 1,000 to 5,000 hours at 125°C
- Suitable to fit for automotive equipment
- Solvent resistant type except 63 to 450V<sub>dc</sub> (see PRECAUTIONS AND GUIDELINES)
- Vibration resistant structure
- RoHS Compliant



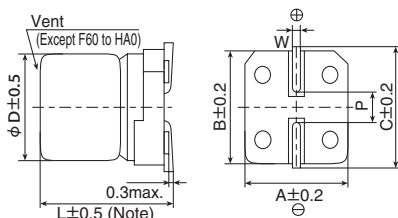
## SPECIFICATIONS

| Items                                                  | Characteristics                                                                                                                                                                                                                                                                                                                    |                   |                                                                                                                                                                                                                           |      |      |      |                           |                                      |              |      |             |            |            |
|--------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------------------|--------------------------------------|--------------|------|-------------|------------|------------|
| Category                                               | Temperature Range                                                                                                                                                                                                                                                                                                                  |                   |                                                                                                                                                                                                                           |      |      |      |                           |                                      |              |      |             |            |            |
| Rated Voltage Range                                    | -40 to +125°C                                                                                                                                                                                                                                                                                                                      |                   |                                                                                                                                                                                                                           |      |      |      |                           |                                      |              |      |             |            |            |
| Capacitance Tolerance                                  | ±20% (M) (at 20°C, 120Hz)                                                                                                                                                                                                                                                                                                          |                   |                                                                                                                                                                                                                           |      |      |      |                           |                                      |              |      |             |            |            |
| Leakage Current                                        | Rated voltage (V <sub>dc</sub> )                                                                                                                                                                                                                                                                                                   |                   | 10 to 100V <sub>dc</sub>                                                                                                                                                                                                  |      |      |      | 160 to 450V <sub>dc</sub> |                                      |              |      |             |            |            |
|                                                        | F60 to JA0                                                                                                                                                                                                                                                                                                                         |                   | I=0.01CV or 3μA, whichever is greater.                                                                                                                                                                                    |      |      |      |                           |                                      | I=0.04CV+100 |      |             |            |            |
|                                                        | KE0 to MN0                                                                                                                                                                                                                                                                                                                         |                   | I=0.03CV or 4μA, whichever is greater.                                                                                                                                                                                    |      |      |      |                           |                                      |              |      |             |            |            |
|                                                        | Where, I : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) (at 20°C after 2 minutes)                                                                                                                                                                                                                |                   |                                                                                                                                                                                                                           |      |      |      |                           |                                      |              |      |             |            |            |
| Dissipation Factor (tanδ)                              | Rated voltage (V <sub>dc</sub> )                                                                                                                                                                                                                                                                                                   |                   | 10V                                                                                                                                                                                                                       | 16V  | 25V  | 35V  | 50V                       | 63V                                  | 80V          | 100V | 160 to 250V | 400 & 450V |            |
|                                                        | tanδ (Max.)                                                                                                                                                                                                                                                                                                                        | F60 to JA0        | 0.24                                                                                                                                                                                                                      | 0.20 | 0.16 | 0.14 | 0.14                      | 0.12                                 | 0.12         | 0.10 | —           | —          |            |
|                                                        |                                                                                                                                                                                                                                                                                                                                    | KE0 to MN0        | 0.22                                                                                                                                                                                                                      | 0.18 | 0.16 | 0.14 | 0.12                      | 0.14                                 | —            | 0.10 | 0.20        | 0.24       |            |
|                                                        | When nominal capacitance exceeds 1,000μF, add 0.02 to the value above for each 1,000μF increase. (at 20°C, 120Hz)                                                                                                                                                                                                                  |                   |                                                                                                                                                                                                                           |      |      |      |                           |                                      |              |      |             |            |            |
| Low Temperature Characteristics (Max. Impedance Ratio) | Rated voltage (V <sub>dc</sub> )                                                                                                                                                                                                                                                                                                   |                   | 10V                                                                                                                                                                                                                       | 16V  | 25V  | 35V  | 50V                       | 63V                                  | 80V          | 100V | 160 to 250V | 400 & 450V |            |
|                                                        | F60 to JA0                                                                                                                                                                                                                                                                                                                         | Z(−25°C)/Z(+20°C) | 3                                                                                                                                                                                                                         | 2    | 2    | 2    | 2                         | 2                                    | 2            | 2    | —           | —          |            |
|                                                        |                                                                                                                                                                                                                                                                                                                                    | Z(−40°C)/Z(+20°C) | 6                                                                                                                                                                                                                         | 4    | 4    | 3    | 3                         | 3                                    | 3            | 3    | —           | —          |            |
|                                                        | KE0 to MN0                                                                                                                                                                                                                                                                                                                         | Z(−25°C)/Z(+20°C) | 4                                                                                                                                                                                                                         | 3    | 2    | 2    | 2                         | 2                                    | —            | 2    | 3           | 6          |            |
|                                                        |                                                                                                                                                                                                                                                                                                                                    | Z(−40°C)/Z(+20°C) | 8                                                                                                                                                                                                                         | 6    | 4    | 3    | 3                         | 3                                    | —            | 3    | 6           | 10         | (at 120Hz) |
| Endurance                                              | The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for the specified time at 125°C.                                                                                                                                                                       |                   |                                                                                                                                                                                                                           |      |      |      |                           |                                      |              |      |             |            |            |
|                                                        | Time                                                                                                                                                                                                                                                                                                                               |                   | F60 to H63 (10 to 100V <sub>dc</sub> ) : 1,000hours<br>HA0 to JA0 (10 to 100V <sub>dc</sub> ) : 2,000hours<br>KE0 to MN0 (10 to 100V <sub>dc</sub> ) : 5,000hours<br>KE0 to MN0 (160 to 450V <sub>dc</sub> ) : 2,000hours |      |      |      |                           |                                      |              |      |             |            |            |
|                                                        | Capacitance change                                                                                                                                                                                                                                                                                                                 |                   | ≤±30% of the initial value                                                                                                                                                                                                |      |      |      |                           |                                      |              |      |             |            |            |
|                                                        | D.F. (tanδ)                                                                                                                                                                                                                                                                                                                        |                   | ≤300% of the initial specified value                                                                                                                                                                                      |      |      |      |                           |                                      |              |      |             |            |            |
|                                                        | Leakage current                                                                                                                                                                                                                                                                                                                    |                   | ≤The initial specified value                                                                                                                                                                                              |      |      |      |                           |                                      |              |      |             |            |            |
|                                                        |                                                                                                                                                                                                                                                                                                                                    |                   |                                                                                                                                                                                                                           |      |      |      |                           |                                      |              |      |             |            |            |
| Shelf Life                                             | The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours (500 hours for 400 to 450V <sub>dc</sub> ) at 125°C without voltage applied. Before the measurement, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4. |                   |                                                                                                                                                                                                                           |      |      |      |                           |                                      |              |      |             |            |            |
|                                                        | Rated voltage(V <sub>dc</sub> )                                                                                                                                                                                                                                                                                                    |                   | 10 to 50V <sub>dc</sub>                                                                                                                                                                                                   |      |      |      |                           | 63 to 450V <sub>dc</sub>             |              |      |             |            |            |
|                                                        | Capacitance change                                                                                                                                                                                                                                                                                                                 |                   | ≤±30% of the initial value                                                                                                                                                                                                |      |      |      |                           | ≤±30% of the initial value           |              |      |             |            |            |
|                                                        | D.F. (tanδ)                                                                                                                                                                                                                                                                                                                        |                   | ≤300% of the initial specified value                                                                                                                                                                                      |      |      |      |                           | ≤300% of the initial specified value |              |      |             |            |            |
|                                                        | Leakage current                                                                                                                                                                                                                                                                                                                    |                   | ≤The initial specified value                                                                                                                                                                                              |      |      |      |                           | ≤500% of the initial specified value |              |      |             |            |            |
|                                                        |                                                                                                                                                                                                                                                                                                                                    |                   |                                                                                                                                                                                                                           |      |      |      |                           |                                      |              |      |             |            |            |

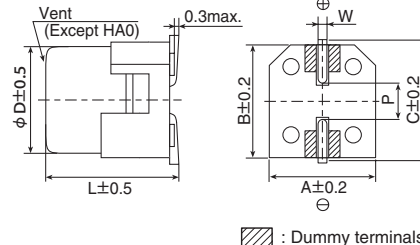
## DIMENSIONS [mm]

- Terminal Code : A
- Size code : F60 to MN0

- Terminal Code : G(Vibration resistant structure)
- Size code : HA0 to MN0

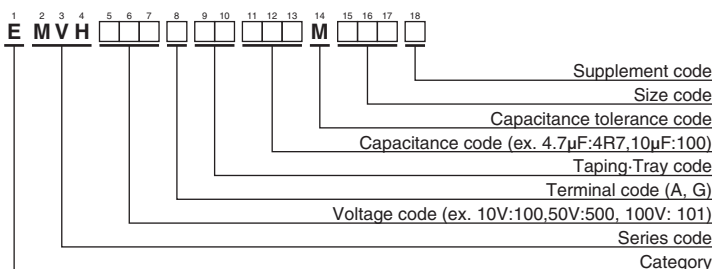


Note : L±0.3 for F60 and F80

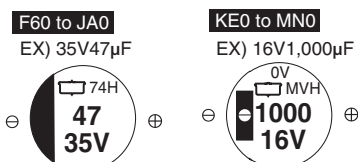


| Size code | D    | L    | A    | B    | C    | W          | P   |
|-----------|------|------|------|------|------|------------|-----|
| F60       | 6.3  | 5.7  | 6.6  | 6.6  | 7.2  | 0.5 to 0.8 | 1.9 |
| F80       | 6.3  | 7.7  | 6.6  | 6.6  | 7.2  | 0.5 to 0.8 | 1.9 |
| H63       | 8    | 6.3  | 8.3  | 8.3  | 9.0  | 0.5 to 0.8 | 2.3 |
| HA0       | 8    | 10.0 | 8.3  | 8.3  | 9.0  | 0.7 to 1.1 | 3.1 |
| JA0       | 10   | 10.0 | 10.3 | 10.3 | 11.0 | 0.7 to 1.1 | 4.5 |
| KE0       | 12.5 | 13.5 | 13.0 | 13.0 | 13.7 | 1.0 to 1.3 | 4.2 |
| KG5       | 12.5 | 16.0 | 13.0 | 13.0 | 13.7 | 1.0 to 1.3 | 4.2 |
| LH0       | 16   | 16.5 | 17.0 | 17.0 | 18.0 | 1.0 to 1.3 | 6.5 |
| LN0       | 16   | 21.5 | 17.0 | 17.0 | 18.0 | 1.0 to 1.3 | 6.5 |
| MH0       | 18   | 16.5 | 19.0 | 19.0 | 20.0 | 1.0 to 1.3 | 6.5 |
| MN0       | 18   | 21.5 | 19.0 | 19.0 | 20.0 | 1.0 to 1.3 | 6.5 |

## PART NUMBERING SYSTEM



## MARKING



Please refer to "Product code guide (surface mount type)"

◆STANDARD RATINGS

□ is not solvent resistant (63 to 450V<sub>dc</sub>).

| WV<br>(V <sub>dc</sub> ) | Cap<br>(μF) | Size<br>code | ESR<br>(Ω max/<br>100kHz) |       | Rated ripple<br>current<br>(mA rms/125°C) |       | Part No.           |
|--------------------------|-------------|--------------|---------------------------|-------|-------------------------------------------|-------|--------------------|
|                          |             |              | 20°C                      | -40°C | 100kHz                                    | 120Hz |                    |
| 10                       | 100         | F80          | 0.90                      | 14.0  | 110                                       | —     | EMVH100ADA101MF80G |
|                          | 100         | H63          | 0.90                      | 14.0  | 110                                       | —     | EMVH100ADA101MH63G |
|                          | 220         | F80          | 0.90                      | 14.0  | 110                                       | —     | EMVH100ADA221MF80G |
|                          | 220         | H63          | 0.90                      | 14.0  | 110                                       | —     | EMVH100ADA221MH63G |
|                          | 220         | HA0          | 0.40                      | 6.0   | 220                                       | —     | EMVH100ADA221MHA0G |
|                          | 330         | HA0          | 0.40                      | 6.0   | 220                                       | —     | EMVH100ADA331MHA0G |
|                          | 330         | JA0          | 0.30                      | 4.5   | 296                                       | —     | EMVH100ADA331MJA0G |
|                          | 470         | JA0          | 0.30                      | 4.5   | 296                                       | —     | EMVH100ADA471MJA0G |
|                          | 1,000       | KE0          | 0.14                      | 2.1   | 750                                       | —     | EMVH100ARA102MKE0S |
|                          | 2,200       | LH0          | 0.10                      | 1.5   | 1,000                                     | —     | EMVH100□DA222MLH0S |
|                          | 2,200       | MH0          | 0.10                      | 1.5   | 1,200                                     | —     | EMVH100□DA222MMH0S |
|                          | 3,300       | MH0          | 0.10                      | 1.5   | 1,200                                     | —     | EMVH100□DA332MMH0S |
|                          | 4,700       | MN0          | 0.058                     | 0.87  | 1,550                                     | —     | EMVH100□DA472MMN0S |
| 16                       | 47          | F60          | 1.6                       | 24.0  | 69                                        | —     | EMVH160ADA470MF60G |
|                          | 100         | HA0          | 0.40                      | 6.0   | 220                                       | —     | EMVH160ADA101MHA0G |
|                          | 220         | HA0          | 0.40                      | 6.0   | 220                                       | —     | EMVH160ADA221MHA0G |
|                          | 220         | JA0          | 0.30                      | 4.5   | 296                                       | —     | EMVH160ADA221MJA0G |
|                          | 330         | JA0          | 0.30                      | 4.5   | 296                                       | —     | EMVH160ADA331MJA0G |
|                          | 470         | KE0          | 0.14                      | 2.1   | 750                                       | —     | EMVH160ARA471MKE0S |
|                          | 680         | KE0          | 0.14                      | 2.1   | 750                                       | —     | EMVH160ARA681MKE0S |
|                          | 680         | LH0          | 0.10                      | 1.5   | 1,000                                     | —     | EMVH160□DA681MLH0S |
|                          | 1,000       | MH0          | 0.10                      | 1.5   | 1,200                                     | —     | EMVH160□DA102MMH0S |
|                          | 2,200       | MH0          | 0.10                      | 1.5   | 1,200                                     | —     | EMVH160□DA222MMH0S |
| 25                       | 33          | F60          | 1.6                       | 24.0  | 69                                        | —     | EMVH250ADA330MF60G |
|                          | 47          | F80          | 0.90                      | 14.0  | 110                                       | —     | EMVH250ADA470MF80G |
|                          | 47          | H63          | 0.90                      | 14.0  | 110                                       | —     | EMVH250ADA470MH63G |
|                          | 100         | F80          | 0.90                      | 14.0  | 110                                       | —     | EMVH250ADA101MF80G |
|                          | 100         | H63          | 0.90                      | 14.0  | 110                                       | —     | EMVH250ADA101MH63G |
|                          | 100         | HA0          | 0.40                      | 6.0   | 220                                       | —     | EMVH250ADA101MHA0G |
|                          | 220         | HA0          | 0.40                      | 6.0   | 220                                       | —     | EMVH250ADA221MHA0G |
|                          | 220         | JA0          | 0.30                      | 4.5   | 296                                       | —     | EMVH250ADA221MJA0G |
|                          | 330         | JA0          | 0.30                      | 4.5   | 296                                       | —     | EMVH250ADA331MJA0G |
|                          | 330         | KE0          | 0.14                      | 2.1   | 750                                       | —     | EMVH250ARA331MKE0S |
|                          | 470         | KE0          | 0.14                      | 2.1   | 750                                       | —     | EMVH250ARA471MKE0S |
|                          | 470         | LH0          | 0.10                      | 1.5   | 1,000                                     | —     | EMVH250□DA471MLH0S |
|                          | 680         | LH0          | 0.10                      | 1.5   | 1,000                                     | —     | EMVH250□DA681MLH0S |
| 35                       | 680         | MH0          | 0.10                      | 1.5   | 1,200                                     | —     | EMVH250□DA681MMH0S |
|                          | 1,000       | MN0          | 0.058                     | 0.87  | 1,550                                     | —     | EMVH250□DA102MMN0S |
|                          | 10          | F60          | 1.6                       | 24.0  | 69                                        | —     | EMVH350ADA100MF60G |
|                          | 22          | F60          | 1.6                       | 24.0  | 69                                        | —     | EMVH350ADA220MF60G |
|                          | 33          | F80          | 0.90                      | 14.0  | 110                                       | —     | EMVH350ADA330MF80G |
|                          | 33          | H63          | 0.90                      | 14.0  | 110                                       | —     | EMVH350ADA330MH63G |
|                          | 47          | F80          | 0.90                      | 14.0  | 110                                       | —     | EMVH350ADA470MF80G |
|                          | 47          | H63          | 0.90                      | 14.0  | 110                                       | —     | EMVH350ADA470MH63G |
|                          | 47          | HA0          | 0.40                      | 6.0   | 220                                       | —     | EMVH350ADA470MHA0G |
|                          | 100         | HA0          | 0.40                      | 6.0   | 220                                       | —     | EMVH350ADA101MHA0G |
|                          | 100         | JA0          | 0.30                      | 4.5   | 296                                       | —     | EMVH350ADA101MJA0G |
|                          | 220         | JA0          | 0.30                      | 4.5   | 296                                       | —     | EMVH350ADA221MJA0G |
|                          | 330         | KE0          | 0.14                      | 2.1   | 750                                       | —     | EMVH350ARA331MKE0S |
| 50                       | 330         | LH0          | 0.10                      | 1.5   | 1,000                                     | —     | EMVH350□DA331MLH0S |
|                          | 470         | KG5          | 0.11                      | 1.5   | 900                                       | —     | EMVH350ARA471MKG5S |
|                          | 470         | LH0          | 0.10                      | 1.5   | 1,000                                     | —     | EMVH350□DA471MLH0S |
|                          | 680         | MH0          | 0.10                      | 1.5   | 1,200                                     | —     | EMVH350□DA681MMH0S |
|                          | 10          | F60          | 2.8                       | 42.0  | 51                                        | —     | EMVH500ADA100MF60G |
|                          | 10          | H63          | 1.6                       | 30.0  | 83                                        | —     | EMVH500ADA100MH63G |
|                          | 22          | F80          | 2.0                       | 30.0  | 83                                        | —     | EMVH500ADA220MF80G |
|                          | 22          | H63          | 1.6                       | 30.0  | 83                                        | —     | EMVH500ADA220MH63G |
| 50                       | 33          | F80          | 2.0                       | 30.0  | 83                                        | —     | EMVH500ADA330MF80G |
|                          | 33          | H63          | 1.6                       | 30.0  | 83                                        | —     | EMVH500ADA330MH63G |
|                          | 33          | HA0          | 0.70                      | 11.0  | 160                                       | —     | EMVH500ADA330MHA0G |
|                          | 47          | HA0          | 0.70                      | 11.0  | 160                                       | —     | EMVH500ADA470MHA0G |
|                          | 47          | JA0          | 0.50                      | 7.5   | 247                                       | —     | EMVH500ADA470MJA0G |
|                          | 100         | JA0          | 0.50                      | 7.5   | 247                                       | —     | EMVH500ADA101MJA0G |
|                          | 100         | KE0          | 0.23                      | 3.5   | 550                                       | —     | EMVH500ARA101MKE0S |
|                          | 220         | KE0          | 0.23                      | 3.5   | 550                                       | —     | EMVH500ARA221MKE0S |
|                          | 220         | LH0          | 0.15                      | 2.3   | 850                                       | —     | EMVH500□DA221MLH0S |
|                          | 330         | KG5          | 0.18                      | 2.7   | 700                                       | —     | EMVH500ARA331MKG5S |
|                          | 330         | LH0          | 0.15                      | 2.3   | 850                                       | —     | EMVH500□DA331MLH0S |
|                          | 470         | MH0          | 0.15                      | 2.3   | 920                                       | —     | EMVH500□DA471MMH0S |
|                          | 10          | F80          | 2.0                       | 100   | 60                                        | —     | EMVH630ADA100MF80G |
| 63                       | 10          | H63          | 2.0                       | 110   | 60                                        | —     | EMVH630ADA100MH63G |
|                          | 22          | HA0          | 0.70                      | 35.0  | 100                                       | —     | EMVH630ADA220MHA0G |
|                          | 33          | HA0          | 0.70                      | 35.0  | 100                                       | —     | EMVH630ADA330MHA0G |
|                          | 33          | JA0          | 0.50                      | 25.0  | 170                                       | —     | EMVH630ADA330MJA0G |
|                          | 47          | HA0          | 0.70                      | 35.0  | 100                                       | —     | EMVH630ADA470MHA0G |
|                          | 47          | JA0          | 0.50                      | 25.0  | 170                                       | —     | EMVH630ADA470MJA0G |
|                          | 100         | KE0          | 0.25                      | 12.5  | 500                                       | —     | EMVH630ARA101MKE0S |
|                          | 220         | KG5          | 0.20                      | 10.0  | 600                                       | —     | EMVH630ARA221MKG5S |
|                          | 330         | LH0          | 0.18                      | 9.0   | 820                                       | —     | EMVH630□DA331MLH0S |
|                          | 470         | LN0          | 0.11                      | 5.5   | 1,100                                     | —     | EMVH630□DA471MLN0S |
|                          | 10          | HA0          | 0.75                      | 50.0  | 70                                        | —     | EMVH800ADA100MHA0G |
|                          | 22          | HA0          | 0.75                      | 50.0  | 70                                        | —     | EMVH800ADA220MHA0G |
|                          | 22          | JA0          | 0.55                      | 35.0  | 115                                       | —     | EMVH800ADA220MJA0G |
| 80                       | 33          | HA0          | 0.75                      | 50.0  | 70                                        | —     | EMVH800ADA330MHA0G |
|                          | 33          | JA0          | 0.55                      | 35.0  | 115                                       | —     | EMVH800ADA330MJA0G |
|                          | 47          | JA0          | 0.55                      | 35.0  | 115                                       | —     | EMVH800ADA470MJA0G |
|                          | 10          | HA0          | 0.75                      | 50.0  | 70                                        | —     | EMVH101ADA100MHA0G |
|                          | 22          | HA0          | 0.75                      | 50.0  | 70                                        | —     | EMVH101ADA220MHA0G |
|                          | 22          | JA0          | 0.55                      | 35.0  | 115                                       | —     | EMVH101ADA220MJA0G |
|                          | 33          | JA0          | 0.55                      | 35.0  | 115                                       | —     | EMVH101ADA330MJA0G |
|                          | 47          | KE0          | 0.33                      | 16.5  | 450                                       | —     | EMVH101ARA470MKE0S |
|                          | 68          | KG5          | 0.26                      | 13.0  | 550                                       | —     | EMVH101ARA680MKG5S |
|                          | 100         | LH0          | 0.24                      | 12.0  | 650                                       | —     | EMVH101□DA101MLH0S |
|                          | 220         | MN0          | 0.16                      | 8.0   | 950                                       | —     | EMVH101□DA221MMN0S |
|                          | 10          | KE0          | —                         | —     | —                                         | 100   | EMVH161ARA100MKE0S |
|                          | 22          | LH0          | —                         | —     | —                                         | 180   | EMVH161□DA220MLH0S |
| 100                      | 33          | MH0          | —                         | —     | —                                         | 245   | EMVH161□DA330MMH0S |
|                          | 68          | MN0          | —                         | —     | —                                         | 380   | EMVH161□DA680MMN0S |
|                          | 10          | KE0          | —                         | —     | —                                         | 100   | EMVH201ARA100MKE0S |
|                          | 22          | LH0          | —                         | —     | —                                         | 180   | EMVH201□DA220MLH0S |
|                          | 33          | LN0          | —                         | —     | —                                         | 250   | EMVH201□DA330MLN0S |
|                          | 33          | MH0          | —                         | —     | —                                         | 245   | EMVH201□DA330MMH0S |
|                          | 47          | MN0          | —                         | —     | —                                         | 315   | EMVH201□DA470MMN0S |
|                          | 10          | KG5          | —                         | —     | —                                         | 110   | EMVH251ARA100MKG5S |
|                          | 22          | LN0          | —                         | —     | —                                         | 200   | EMVH251□DA220MLN0S |
|                          | 22          | MH0          | —                         | —     | —                                         | 205   | EMVH251□DA220MMH0S |
|                          | 33          | MN0          | —                         | —     | —                                         | 260   | EMVH251□DA330MMN0S |
|                          | 4.7         | KE0          | —                         | —     | —                                         | 70    | EMVH401ARA47MKE0S  |
|                          | 6.8         | LH0          | —                         | —     | —                                         | 100   | EMVH401□DA688MLH0S |
| 160                      | 10          | LN0          | —                         | —     | —                                         | 140   | EMVH401□DA100MLN0S |
|                          | 10          | MH0          | —                         | —     | —                                         | 135   | EMVH401□DA100MMH0S |
|                          | 3.3         | KG5          | —                         | —     | —                                         | 65    | EMVH451ARA33MKG5S  |
|                          | 4.7         | LH0          | —                         | —     | —                                         | 85    | EMVH451□DA47MLH0S  |
|                          | 10          | MN0          | —                         | —     | —                                         | 145   | EMVH451□DA100MMN0S |

□ : Enter the appropriate terminal code.

◆RATED RIPPLE CURRENT MULTIPLIERS

●Frequency Multipliers

| Rated voltage<br>(V <sub>dc</sub> ) | Size code  | Frequency(Hz)   |      |      |      |      |
|-------------------------------------|------------|-----------------|------|------|------|------|
|                                     |            | Capacitance(μF) | 120  | 1k   | 10k  | 100k |
| 10 to 100                           | F60 to JA0 | 10              | 0.66 | 0.86 | 0.93 | 1.00 |
|                                     |            | 22 to 470       | 0.93 | 0.97 | 1.00 | 1.00 |
|                                     |            | 47 to 100       | 0.40 | 0.75 | 0.90 | 1.00 |
|                                     |            | 220 to 470      | 0.50 | 0.85 | 0.94 | 1.00 |
|                                     |            | 680 to 1,000    | 0.60 | 0.87 | 0.95 | 1.00 |
|                                     | KE0 to MN0 | 2,200 to 3,300  | 0.75 | 0.90 | 0.95 | 1.00 |
|                                     |            | 4,700           | 0.85 | 0.95 | 0.98 | 1.00 |
|                                     |            | 3.3 to 33       | 1.00 | 1.50 | 1.75 | 1.80 |
|                                     |            | 47 to 68        | 1.00 | 1.30 | 1.40 | 1.50 |
|                                     |            |                 |      |      |      |      |
| 160 to 450                          | KE0 to MN0 |                 |      |      |      |      |

The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 5°C rise.

When long life performance is required in actual use, the rms ripple current has to be reduced.