

## Surface Mount Type

Series: **S** Type: **V**

S High temperature Lead-Free reflow (suffix:A\*)



### ■ Features

- Endurance: 85 °C 2000 h
- Vibration-proof product is available upon request.( $\phi 8$  mm and larger)
- RoHS directive compliant

### ■ Specifications

|                                    |                                                                                                                                                                                               |                                   |    |    |    |    |                  |                             |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----|----|----|----|------------------|-----------------------------|
| Category Temp. Range               | -40 °C to +85 °C                                                                                                                                                                              |                                   |    |    |    |    |                  |                             |
| Rated W.V. Range                   | 6.3 V.DC to 50 V.DC                                                                                                                                                                           |                                   |    |    |    |    |                  |                             |
| Nominal Cap. Range                 | 0.1 μF to 1500 μF                                                                                                                                                                             |                                   |    |    |    |    |                  |                             |
| Capacitance Tolerance              | ±20 % (120 Hz/+20 °C)                                                                                                                                                                         |                                   |    |    |    |    |                  |                             |
| DC Leakage Current                 | I ≤ 0.01 CV or 3 (μA) After 2 minutes (Whichever is greater)                                                                                                                                  |                                   |    |    |    |    |                  |                             |
| tan δ                              | Please see the attached High temperature lead-free reflow products list.                                                                                                                      |                                   |    |    |    |    |                  |                             |
| Characteristics at Low Temperature | W.V. (V)                                                                                                                                                                                      | 6.3                               | 10 | 16 | 25 | 35 | 50               | (Impedance ratio at 120 Hz) |
|                                    | Z(-25 °C)/Z(+20 °C)                                                                                                                                                                           | 4                                 | 3  | 2  | 2  | 2  | 2                |                             |
|                                    | Z(-40 °C)/Z(+20 °C)                                                                                                                                                                           | 8                                 | 6  | 4  | 4  | 3  | 3                |                             |
| Endurance                          | After applying rated working voltage for 2000 hours (Miniaturization product type 1000 hours) at +85 °C±2 °C and then being stabilized at +20 °C, Capacitors shall meer the following limits. |                                   |    |    |    |    |                  |                             |
|                                    | Capacitance change                                                                                                                                                                            | ±20 % of initial measured value   |    |    |    |    |                  |                             |
|                                    |                                                                                                                                                                                               | Size code                         |    |    |    |    | Cap. change      |                             |
|                                    |                                                                                                                                                                                               | D8(φ6.3×7.7)                      |    |    |    |    | 2000 hours ±25 % |                             |
|                                    |                                                                                                                                                                                               | ≤D(φ6.3) Miniature                |    |    |    |    | 1000 hours ±30 % |                             |
|                                    | tan δ                                                                                                                                                                                         | ≤200 % of initial specified value |    |    |    |    |                  |                             |
| DC leakage current                 | ≤ initial specified value                                                                                                                                                                     |                                   |    |    |    |    |                  |                             |
| Shelf Life                         | After storage for 1000 hours at +85 °C±2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in Endurance. (With voltage treatment)    |                                   |    |    |    |    |                  |                             |
| Resistance to Soldering Heat       | After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.                                                                                       |                                   |    |    |    |    |                  |                             |
|                                    | Capacitance change                                                                                                                                                                            | ±10 % of initial measured value   |    |    |    |    |                  |                             |
|                                    | tan δ                                                                                                                                                                                         | ≤ initial specified value         |    |    |    |    |                  |                             |
|                                    | DC leakage current                                                                                                                                                                            | ≤ initial specified value         |    |    |    |    |                  |                             |

### ■ Frequency correction factor for ripple current

|                   | Frequency (Hz) |      |      |         |
|-------------------|----------------|------|------|---------|
|                   | 50, 60         | 120  | 1 k  | 10 k to |
| Correction factor | 0.70           | 1.00 | 1.30 | 1.70    |

### ■ Marking

Example: 6.3 V 22  $\mu$ F (Polarized)  
Marking color: BLACK

Negative polarity marking (-)

Capacitance ( $\mu$ F)

Series identification (S) or (A)

Mark for Lead-Free Products Black Dot (Square)

Lot number

Rated voltage Mark (V.DC) (6=6.3 V.DC)

### ■ Dimensions in mm (not to scale)

(Unit : mm)

0.3 max.

$A \pm 0.2$

$B \pm 0.2$

$\phi D \pm 0.5$

L

H

I

W

P

K

Pressure Relief ( $\phi 10$  and larger)

( ) Reference size

| Size code | D    | L                   | A, B | H        | I   | W              | P   | K                      |
|-----------|------|---------------------|------|----------|-----|----------------|-----|------------------------|
| B         | 4.0  | $5.4^{+0.1}_{-0.2}$ | 4.3  | 5.5 max  | 1.8 | $0.65 \pm 0.1$ | 1.0 | $0.35^{+0.15}_{-0.20}$ |
| C         | 5.0  | $5.4^{+0.1}_{-0.2}$ | 5.3  | 6.5 max  | 2.2 | $0.65 \pm 0.1$ | 1.5 | $0.35^{+0.15}_{-0.20}$ |
| D         | 6.3  | $5.4^{+0.1}_{-0.2}$ | 6.6  | 7.8 max  | 2.6 | $0.65 \pm 0.1$ | 1.8 | $0.35^{+0.15}_{-0.20}$ |
| D8        | 6.3  | $7.7 \pm 0.3$       | 6.6  | 7.8 max  | 2.6 | $0.65 \pm 0.1$ | 1.8 | $0.35^{+0.15}_{-0.20}$ |
| E         | 8.0  | $6.2 \pm 0.3$       | 8.3  | 9.5 max  | 3.4 | $0.65 \pm 0.1$ | 2.2 | $0.35^{+0.15}_{-0.20}$ |
| F         | 8.0  | $10.2 \pm 0.3$      | 8.3  | 10.0 max | 3.4 | $0.90 \pm 0.2$ | 3.1 | $0.70 \pm 0.20$        |
| G         | 10.0 | $10.2 \pm 0.3$      | 10.3 | 12.0 max | 3.5 | $0.90 \pm 0.2$ | 4.6 | $0.70 \pm 0.20$        |

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.  
Should a safety concern arise regarding this product, please be sure to contact us immediately.

00 Nov. 2012

## ■ High temperature Lead-Free reflow Products

| W.V. | Cap.<br>(±20 %) | Case size |        |               | Specification                                            |                               |              | Part No.<br>(RoHS:compliant) | Reflow | Min.<br>Packaging Q'ty |
|------|-----------------|-----------|--------|---------------|----------------------------------------------------------|-------------------------------|--------------|------------------------------|--------|------------------------|
|      |                 | Dia.      | Length | *Size<br>Code | Ripple<br>Current<br>(120 Hz)<br>(+85 °C)<br>(mA r.m.s.) | tan δ<br>(120 Hz)<br>(+20 °C) | Endurance    |                              |        | Taping                 |
| (V)  | (μF)            | (mm)      | (mm)   |               |                                                          |                               | (hours)      |                              |        | (pcs)                  |
| 6.3  | 22              | 4         | 5.4    | B             | 29                                                       | 0.30                          | 2000         | EEE0JA220AR                  | (5)    | 2000                   |
|      | 33              | 4         | 5.4    | (B)           | 22                                                       | 0.35                          | 1000         | EEE0JA330WAR                 | (5)    | 2000                   |
|      | 47              | 5         | 5.4    | C             | 46                                                       | 0.30                          | 2000         | EEE0JA470AR                  | (5)    | 1000                   |
|      | 100             | 5         | 5.4    | (C)           | 47                                                       | 0.40                          | 1000         | EEE0JA101WAR                 | (5)    | 1000                   |
|      |                 | 6.3       | 5.4    | D             | 71                                                       | 0.30                          | 2000         | EEE0JA101AP                  | (5)    | 1000                   |
|      | 330             | 6.3       | 7.7    | D8            | 188                                                      | 0.30                          | 2000         | EEE0JA331XAP                 | (5)    | 900                    |
|      |                 | 8         | 6.2    | E             | 300                                                      | 0.35                          | 2000         | EEE0JA331AP                  | (7)    | 1000                   |
|      | 470             | 8         | 10.2   | (F)           | 380                                                      | 0.35                          | 1000         | EEE0JA471UAP                 | (7)    | 500                    |
|      | 1000            | 10        | 10.2   | G             | 700                                                      | 0.35                          | 2000         | EEE0JA102AP                  | (7)    | 500                    |
| 1500 | 10              | 10.2      | (G)    | 750           | 0.50                                                     | 1000                          | EEE0JA152UAP | (7)                          | 500    |                        |
| 10   | 22              | 4         | 5.4    | (B)           | 28                                                       | 0.30                          | 1000         | EEE1AA220WAR                 | (5)    | 2000                   |
|      | 33              | 4         | 5.4    | (B)           | 29                                                       | 0.30                          | 1000         | EEE1AA330WAR                 | (5)    | 2000                   |
|      |                 | 5         | 5.4    | C             | 43                                                       | 0.22                          | 2000         | EEE1AA330AR                  | (5)    | 1000                   |
|      | 47              | 5         | 5.4    | (C)           | 47                                                       | 0.30                          | 1000         | EEE1AA470WAR                 | (5)    | 1000                   |
|      | 100             | 5         | 5.4    | (C)           | 50                                                       | 0.30                          | 1000         | EEE1AA101WAR                 | (5)    | 1000                   |
|      |                 | 6.3       | 5.4    | D             | 70                                                       | 0.26                          | 2000         | EEE1AA101AP                  | (5)    | 1000                   |
|      | 220             | 6.3       | 7.7    | D8            | 173                                                      | 0.22                          | 2000         | EEE1AA221XAP                 | (5)    | 900                    |
|      |                 | 8         | 6.2    | E             | 250                                                      | 0.26                          | 2000         | EEE1AA221AP                  | (7)    | 1000                   |
|      | 330             | 8         | 10.2   | F             | 390                                                      | 0.26                          | 2000         | EEE1AA331AP                  | (7)    | 500                    |
|      | 470             | 8         | 10.2   | (F)           | 390                                                      | 0.26                          | 1000         | EEE1AA471UAP                 | (7)    | 500                    |
| 10   |                 | 10.2      | G      | 400           | 0.26                                                     | 2000                          | EEE1AA471AP  | (7)                          | 500    |                        |
| 1000 | 10              | 10.2      | (G)    | 580           | 0.35                                                     | 1000                          | EEE1AA102UAP | (7)                          | 500    |                        |
| 16   | 10              | 4         | 5.4    | B             | 28                                                       | 0.16                          | 2000         | EEE1CA100AR                  | (5)    | 2000                   |
|      | 22              | 4         | 5.4    | (B)           | 28                                                       | 0.26                          | 1000         | EEE1CA220WAR                 | (5)    | 2000                   |
|      |                 | 5         | 5.4    | C             | 39                                                       | 0.16                          | 2000         | EEE1CA220AR                  | (5)    | 1000                   |
|      | 33              | 5         | 5.4    | (C)           | 35                                                       | 0.26                          | 1000         | EEE1CA330WAR                 | (5)    | 1000                   |
|      | 47              | 5         | 5.4    | (C)           | 39                                                       | 0.26                          | 1000         | EEE1CA470WAR                 | (5)    | 1000                   |
|      |                 | 6.3       | 5.4    | D             | 70                                                       | 0.16                          | 2000         | EEE1CA470AP                  | (5)    | 1000                   |
|      | 100             | 6.3       | 5.4    | (D)           | 70                                                       | 0.26                          | 1000         | EEE1CA101WAP                 | (5)    | 1000                   |
|      |                 | 8         | 6.2    | E             | 200                                                      | 0.20                          | 2000         | EEE1CA101AP                  | (7)    | 1000                   |
|      | 220             | 6.3       | 7.7    | D8            | 162                                                      | 0.20                          | 2000         | EEE1CA221XAP                 | (5)    | 900                    |
|      |                 | 8         | 10.2   | (F)           | 280                                                      | 0.20                          | 1000         | EEE1CA221UAP                 | (7)    | 500                    |
|      | 330             | 8         | 10.2   | (F)           | 320                                                      | 0.20                          | 1000         | EEE1CA331UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 380                                                      | 0.20                          | 2000         | EEE1CA331AP                  | (7)    | 500                    |
|      | 470             | 8         | 10.2   | (F)           | 350                                                      | 0.26                          | 1000         | EEE1CA471UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 420                                                      | 0.20                          | 2000         | EEE1CA471AP                  | (7)    | 500                    |
| 25   | 4.7             | 4         | 5.4    | B             | 22                                                       | 0.14                          | 2000         | EEE1EA4R7AR                  | (5)    | 2000                   |
|      | 10              | 4         | 5.4    | (B)           | 22                                                       | 0.20                          | 1000         | EEE1EA100WAR                 | (5)    | 2000                   |
|      |                 | 5         | 5.4    | C             | 28                                                       | 0.14                          | 2000         | EEE1EA100AR                  | (5)    | 1000                   |
|      | 22              | 5         | 5.4    | (C)           | 35                                                       | 0.20                          | 1000         | EEE1EA220WAR                 | (5)    | 1000                   |
|      |                 | 6.3       | 5.4    | D             | 55                                                       | 0.14                          | 2000         | EEE1EA220AP                  | (5)    | 1000                   |
|      | 33              | 5         | 5.4    | (C)           | 42                                                       | 0.20                          | 1000         | EEE1EA330WAR                 | (5)    | 1000                   |
|      |                 | 6.3       | 5.4    | D             | 65                                                       | 0.14                          | 2000         | EEE1EA330AP                  | (5)    | 1000                   |
|      | 47              | 6.3       | 5.4    | (D)           | 70                                                       | 0.20                          | 1000         | EEE1EA470WAP                 | (5)    | 1000                   |
|      | 100             | 8         | 6.2    | (E)           | 91                                                       | 0.16                          | 1000         | EEE1EA101UAP                 | (7)    | 1000                   |
|      |                 | 6.3       | 7.7    | D8            | 143                                                      | 0.16                          | 2000         | EEE1EA101XAP                 | (5)    | 900                    |
|      |                 | 8         | 10.2   | F             | 180                                                      | 0.16                          | 2000         | EEE1EA101AP                  | (7)    | 500                    |
|      | 220             | 8         | 10.2   | (F)           | 230                                                      | 0.20                          | 1000         | EEE1EA221UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 310                                                      | 0.16                          | 2000         | EEE1EA221AP                  | (7)    | 500                    |
|      | 330             | 8         | 10.2   | (F)           | 270                                                      | 0.20                          | 1000         | EEE1EA331UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 340                                                      | 0.16                          | 2000         | EEE1EA331AP                  | (7)    | 500                    |
|      | 470             | 10        | 10.2   | (G)           | 380                                                      | 0.25                          | 1000         | EEE1EA471UAP                 | (7)    | 500                    |

\* Size code( ):Miniaturization product

· Please refer to the page of "Reflow Profile" and "The Taping Dimensions".

· When requesting vibration-proof product, please put the last "V" instead to "P"

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# ■ High temperature Lead-Free reflow Products

| W.V. | Cap.<br>(±20 %) | Case size |        |               | Specification                                            |                                       |           | Part No.<br>(RoHS:compliant) | Reflow | Min.<br>Packaging Q'ty |
|------|-----------------|-----------|--------|---------------|----------------------------------------------------------|---------------------------------------|-----------|------------------------------|--------|------------------------|
|      |                 | Dia.      | Length | *Size<br>Code | Ripple<br>Current<br>(120 Hz)<br>(+85 °C)<br>(mA r.m.s.) | $\tan \delta$<br>(120 Hz)<br>(+20 °C) | Endurance |                              |        | Taping                 |
| (V)  | (μF)            | (mm)      | (mm)   |               |                                                          |                                       | (hours)   |                              |        | (pcs)                  |
| 35   | 4.7             | 4         | 5.4    | B             | 22                                                       | 0.12                                  | 2000      | EEE1VA4R7AR                  | (5)    | 2000                   |
|      | 10              | 4         | 5.4    | (B)           | 22                                                       | 0.16                                  | 1000      | EEE1VA100WAR                 | (5)    | 2000                   |
|      |                 | 5         | 5.4    | C             | 30                                                       | 0.12                                  | 2000      | EEE1VA100AR                  | (5)    | 1000                   |
|      | 22              | 5         | 5.4    | (C)           | 36                                                       | 0.16                                  | 1000      | EEE1VA220WAR                 | (5)    | 1000                   |
|      |                 | 6.3       | 5.4    | D             | 60                                                       | 0.12                                  | 2000      | EEE1VA220AP                  | (5)    | 1000                   |
|      | 33              | 6.3       | 5.4    | (D)           | 60                                                       | 0.16                                  | 1000      | EEE1VA330WAP                 | (5)    | 1000                   |
|      |                 | 8         | 6.2    | E             | 130                                                      | 0.14                                  | 2000      | EEE1VA330AP                  | (7)    | 1000                   |
|      | 47              | 6.3       | 5.4    | (D)           | 70                                                       | 0.16                                  | 1000      | EEE1VA470WAP                 | (5)    | 1000                   |
|      |                 | 8         | 6.2    | E             | 165                                                      | 0.14                                  | 2000      | EEE1VA470AP                  | (7)    | 1000                   |
|      | 100             | 6.3       | 7.7    | D8            | 132                                                      | 0.14                                  | 2000      | EEE1VA101XAP                 | (5)    | 900                    |
|      |                 | 8         | 10.2   | (F)           | 140                                                      | 0.14                                  | 1000      | EEE1VA101UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 210                                                      | 0.14                                  | 2000      | EEE1VA101AP                  | (7)    | 500                    |
|      | 220             | 8         | 10.2   | (F)           | 200                                                      | 0.14                                  | 1000      | EEE1VA221UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 310                                                      | 0.14                                  | 2000      | EEE1VA221AP                  | (7)    | 500                    |
|      | 330             | 10        | 10.2   | (G)           | 350                                                      | 0.30                                  | 1000      | EEE1VA331UAP                 | (7)    | 500                    |
| 50   | 0.1             | 4         | 5.4    | B             | 1                                                        | 0.12                                  | 2000      | EEE1HAR10AR                  | (5)    | 2000                   |
|      | 0.22            | 4         | 5.4    | B             | 2                                                        | 0.12                                  | 2000      | EEE1HAR22AR                  | (5)    | 2000                   |
|      | 0.33            | 4         | 5.4    | B             | 3                                                        | 0.12                                  | 2000      | EEE1HAR33AR                  | (5)    | 2000                   |
|      | 0.47            | 4         | 5.4    | B             | 5                                                        | 0.12                                  | 2000      | EEE1HAR47AR                  | (5)    | 2000                   |
|      | 1               | 4         | 5.4    | B             | 10                                                       | 0.12                                  | 2000      | EEE1HA1R0AR                  | (5)    | 2000                   |
|      | 2.2             | 4         | 5.4    | B             | 16                                                       | 0.12                                  | 2000      | EEE1HA2R2AR                  | (5)    | 2000                   |
|      | 3.3             | 4         | 5.4    | B             | 16                                                       | 0.12                                  | 2000      | EEE1HA3R3AR                  | (5)    | 2000                   |
|      | 4.7             | 4         | 5.4    | (B)           | 18                                                       | 0.14                                  | 1000      | EEE1HA4R7WAR                 | (5)    | 2000                   |
|      |                 | 5         | 5.4    | C             | 23                                                       | 0.12                                  | 2000      | EEE1HA4R7AR                  | (5)    | 1000                   |
|      | 10              | 5         | 5.4    | (C)           | 27                                                       | 0.14                                  | 1000      | EEE1HA100WAR                 | (5)    | 1000                   |
|      |                 | 6.3       | 5.4    | D             | 35                                                       | 0.12                                  | 2000      | EEE1HA100AP                  | (5)    | 1000                   |
|      | 22              | 6.3       | 5.4    | (D)           | 40                                                       | 0.14                                  | 1000      | EEE1HA220WAP                 | (5)    | 1000                   |
|      |                 | 8         | 6.2    | E             | 120                                                      | 0.12                                  | 2000      | EEE1HA220AP                  | (7)    | 1000                   |
|      | 33              | 8         | 6.2    | (E)           | 65                                                       | 0.12                                  | 1000      | EEE1HA330UAP                 | (7)    | 1000                   |
|      |                 | 6.3       | 7.7    | D8            | 65                                                       | 0.14                                  | 2000      | EEE1HA330XAP                 | (5)    | 900                    |
|      |                 | 8         | 10.2   | F             | 110                                                      | 0.12                                  | 2000      | EEE1HA330AP                  | (7)    | 500                    |
|      | 47              | 6.3       | 7.7    | D8            | 105                                                      | 0.14                                  | 2000      | EEE1HA470XAP                 | (5)    | 900                    |
|      |                 | 8         | 10.2   | (F)           | 110                                                      | 0.12                                  | 1000      | EEE1HA470UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 130                                                      | 0.12                                  | 2000      | EEE1HA470AP                  | (7)    | 500                    |
|      | 100             | 8         | 10.2   | (F)           | 200                                                      | 0.18                                  | 1000      | EEE1HA101UAP                 | (7)    | 500                    |
|      |                 | 10        | 10.2   | G             | 250                                                      | 0.12                                  | 2000      | EEE1HA101AP                  | (7)    | 500                    |
|      | 220             | 10        | 10.2   | (G)           | 300                                                      | 0.18                                  | 1000      | EEE1HA221UAP                 | (7)    | 500                    |

\* Size code( ):Miniaturization product

· Please refer to the page of "Reflow Profile" and "The Taping Dimensions".

· When requesting vibration-proof product, please put the last "V" instead to "P"

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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